

# VERIFICATION OF SPREAD MOORING SYSTEMS FOR FLOATING DRILLING PLATFORMS

## VOLUME III: DYNAMIC MODELING FOR SPREAD MOORINGS

by

LAWRENCE A. KAHN  
and  
DAVID B. DILLON

Prepared for

TECHNOLOGY ASSESSMENT AND RESEARCH BRANCH  
MINERALS MANAGEMENT SERVICE  
RESTON, VIRGINIA 22091

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DAVID W. TAYLOR NAVAL SHIP RESEARCH  
AND DEVELOPMENT CENTER  
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## PREFACE

As offshore oil exploration moves into ever deeper waters, greater demands are placed on mooring systems. Safety of the crew, preservation of the environment, and protection of the rig itself demand that mooring systems perform reliably during operations and storms alike. It is the responsibility of the Minerals Management Service (MMS) of the U.S. Department of the Interior to insure the satisfactory performance of mooring equipment aboard exploratory oil rigs in service in United States offshore oil fields. This work was commissioned to provide MMS personnel with a manual for the analytical and physical evaluation of rig mooring systems.

This is Volume III of a four-volume set. The purpose of these manuals is to provide a procedural structure to support the activities of MMS described above. It does not purport to be a textbook of mooring analysis or design, nor a compendium of mooring design data. That ground has been well plowed by others. Rather, a procedure for evaluating the mooring gear for a drilling rig is described.

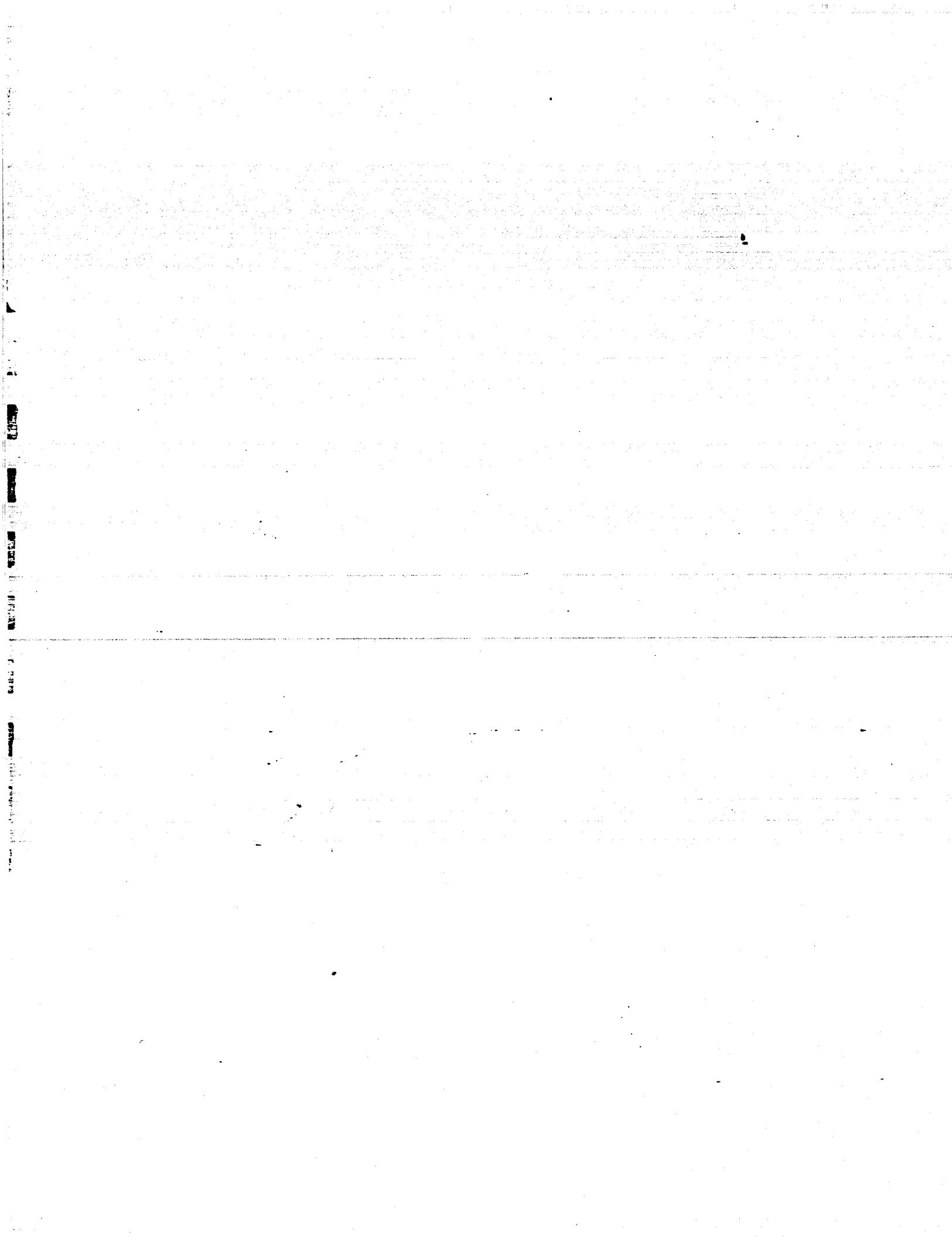
Volume I Methods for Spread Mooring Review  
Volume II Methods for Spread Mooring Inspection  
Volume III Dynamic Modeling in Spread Mooring Review  
Volume IV A Static Model for Spread Mooring Review

Volume I describes five steps for evaluating a mooring design and illustrates the procedure by evaluating a sample semisubmersible mooring. Volume II is a review of mooring evaluation from the standpoint of the hardware itself - the components of a typical mooring, their inspection and testing. Volume IV documents a computer program called RIGMOOR which was prepared to simplify estimating the static holding power of spread moorings.

This manual - Volume III - illustrates dynamic modeling of a spread mooring by using one commercial model to analyze the sample mooring problem used throughout Volume I. The intent is to:

- \* Illustrate how much more information is required to define a dynamic problem than its static equivalent;
- \* Show how to set up a semisubmersible mooring problem as a particular case within the general capability of the large, general model;
- \* Review the output from the model; and
- \* Use the static results of the commercial model to verify RIGMOOR, the static model presented in Volume IV.

This will help the mooring evaluator understand printouts from this and other dynamic models that may be included with design submissions and may encourage him to perform independent checks where unusual dynamic effects are suspected.



## TABLE OF CONTENTS

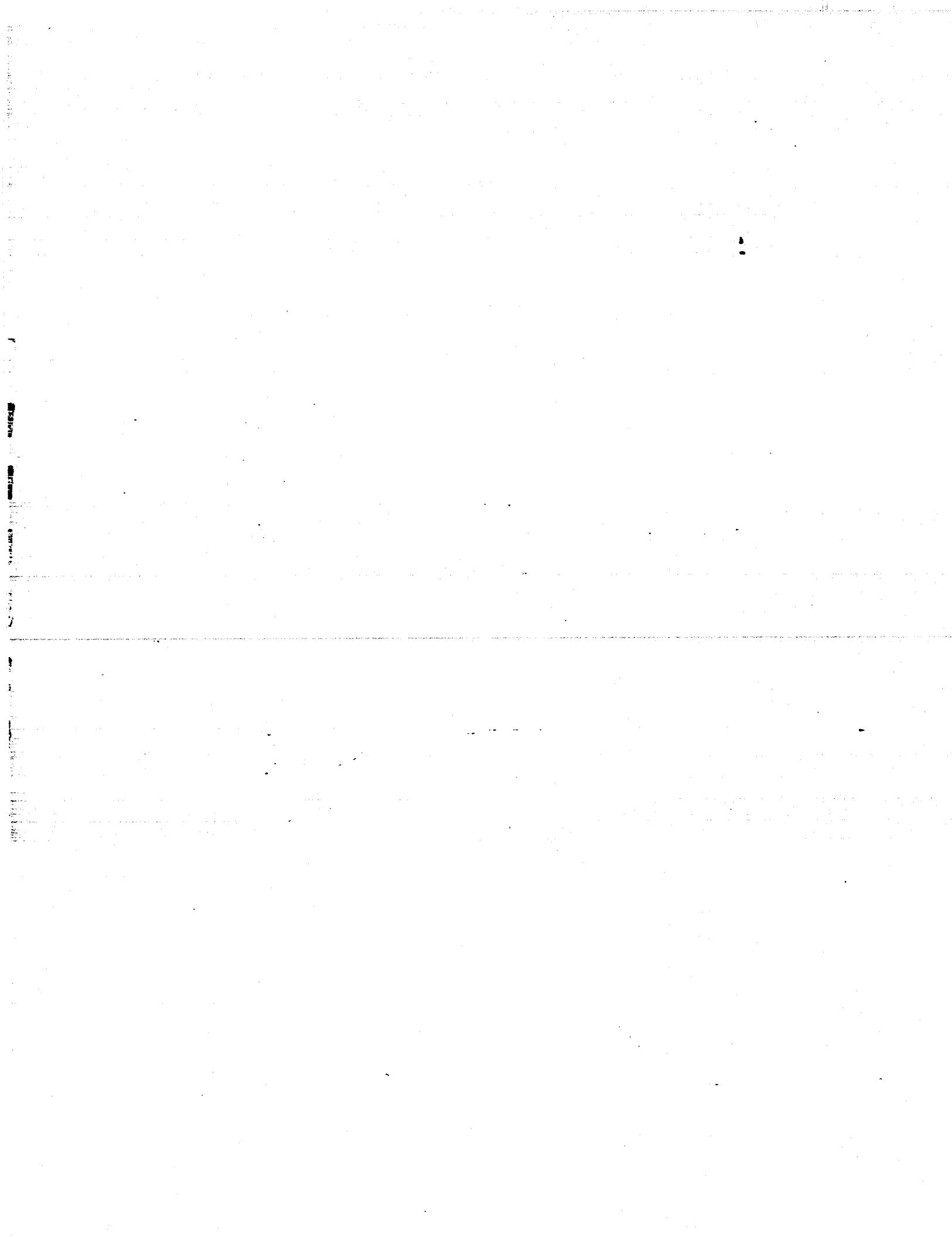
| <u>Section</u> | <u>Description</u>   | <u>Page</u> |
|----------------|--|-------------|
|                | <b>INTRODUCTION</b>  | 1           |
| 1              | <b>OSCAR</b>   | 1-1         |
| 2              | <b>SAMPLE INPUT</b>  | 2-1         |
| 3              | <b>DISCUSSION OF PRINTOUT</b>  | 3-1         |
|                | <b>APPENDICES</b>  |             |
| Appendix A -   | Input Records to Run Sample Problem Using OSCAR Computer Model on Commercial Timesharing Net | A-1         |
| Appendix B -   | Results of Dynamic Analysis of Sample Problem  | B-1         |

## LIST OF FIGURES

| <u>Figure</u> | <u>Description</u>   | <u>Page</u> |
|---------------|--|-------------|
| 1             | Typical Spread Mooring   | 2           |
| 2             | Scale Sketch of Semisubmersible Drilling Platform for Sample Problem | 3           |
| 3             | Sample Rig Mooring Plan  | 5           |
| 1-1           | An OSCAR Model for a Semisubmersible Drilling Platform               | 1-3         |

## LIST OF TABLES

| <u>Table</u> | <u>Description</u>                 | <u>Page</u> |
|--------------|------------------------------------|-------------|
| 1            | Sample Rig Bill of Particulars     | 4           |
| 2            | Sample Mooring Bill of Particulars | 6           |



## INTRODUCTION

Figure 1 shows is a diagram of a typical moored semisubmersible drilling rig. Wind and current forces, and certain components of wave force, displace the rig from its hydrostatic equilibrium position within the mooring. More common wave forces are periodic in nature and the moored rig responds as a non-linear damped spring-mass system. The mechanisms by which waves impart force on a floating object are difficult to express and solve mathematically.

The Reference<sup>1</sup> is an introduction to the major theories that describe wave forces on moored structures. The Morison equation, which describes wave forces on a piling, is commonly applied to the tubular structures of a semisubmersible. Diffraction theory is used to describe the response of drillships. Neither theory has been developed into a definitive formulation and the reference includes a survey of thirty computer programs that use one and/or the other theory to model moored rigs in a seaway.

The weight and restoring force of a spread mooring constrain the response of a drilling rig to the seaway. Dynamic rig motions are usually far from resonant frequencies of the mooring elements, so dynamic rig models rarely attempt to model the dynamic response of the mooring itself, but rather use the mooring as a linear or non-linear restoring force.

Dynamic modeling is much more costly than static modeling, in both computer and human resources. Routine moves of rigs whose characteristics are well known in established oil fields where similar rigs are operating safely need not be re-analyzed. When a rig changes its characteristics by adding, shifting or removing significant weight; rearranges its mooring pattern or changes the size of its mooring lines and anchors; or enters an unfamiliar environment, the prudent operator will anticipate and eliminate problems by getting a dynamic check and the mooring evaluator will expect a dynamic review in the submission.

The models described in the reference are large and complex, requiring technical skill to use effectively. This manual cannot hope to illustrate them all. The underlying purpose is to introduce the mooring evaluator to the kinds of input required by these large models as well as the results that they provide. This will help the evaluator understand dynamic analyses included in mooring submissions and assist him when an independent dynamic analysis is needed.

OSCAR, a dynamic computer model of floating structures developed by Ultra Marine, Inc., was used to estimate wave forces and rig responses for the sample problem presented throughout Volume I. The static results from the example serve to validate RIGMOOR, the static computer model described in Volume IV.

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1. Rajabi, F., S. Ghosh and C. Oran, Review of Semisubmersible and Tension Leg Platform Analysis Techniques, Naval Civil Engineering Laboratory Technical Memorandum 44-85-02CR, 1985 (3 volumes).

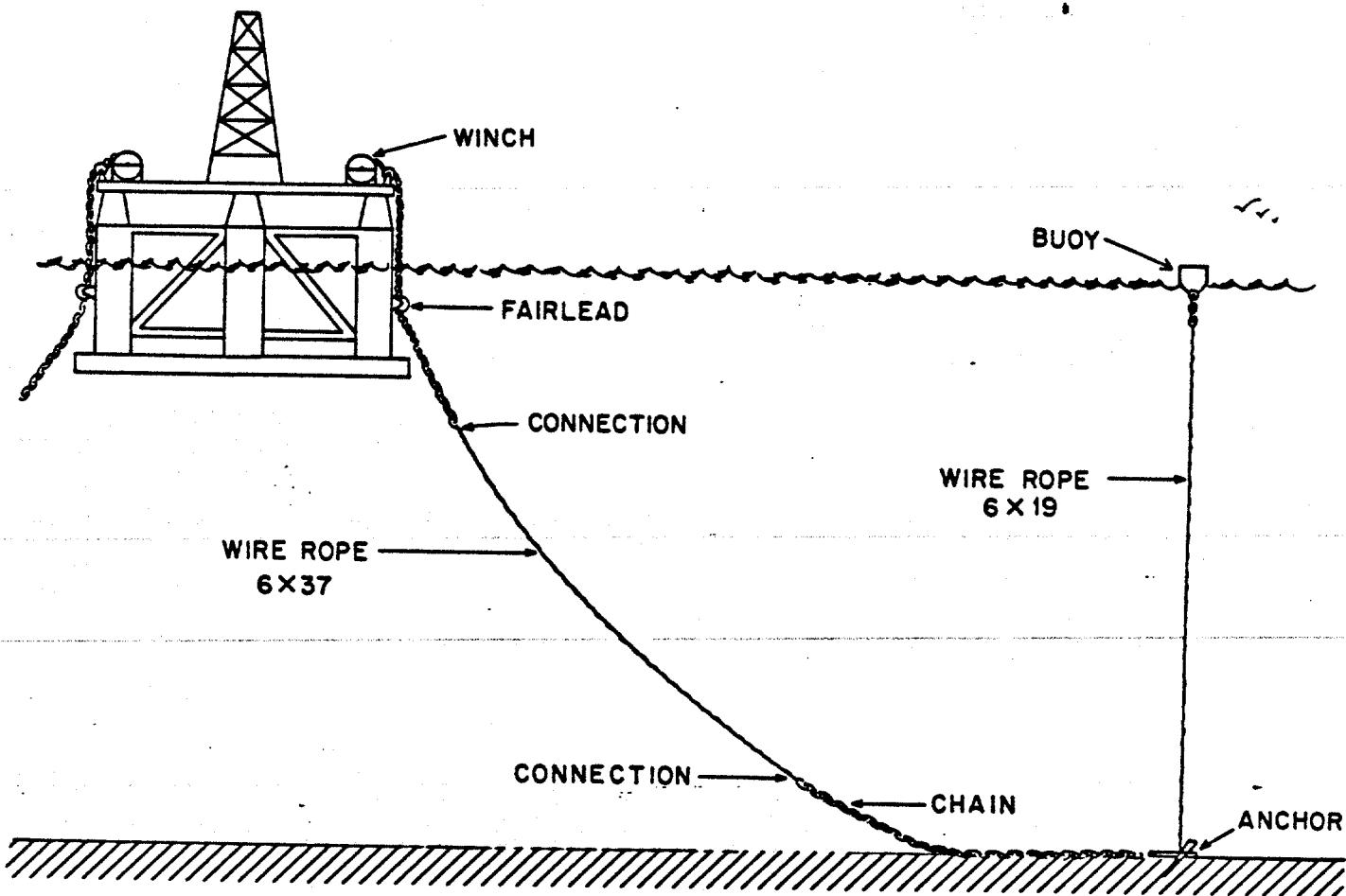


Figure 1. Typical Spread Mooring

Figure 2 is a rough sketch of the hypothetical semisubmersible drilling platform used for the sample problem. Numerical particulars are summarized in Table 1. Figure 3 shows a plan view, including the 0-45-90 pattern of the ten mooring legs.

The mooring plan is untypical of conventional practice for floating drilling rigs in that three distinct styles of mooring legs are deployed at once (see Table 2). The four legs at bow and stern are comprised entirely of chain and the legs at the four corners are all wire rope, while the two legs on the sides link wire rope near the surface with six shots of chain at the anchor. The purpose for this unconventional design is not to commend it for field use, but to illustrate the generality of the computer tools.

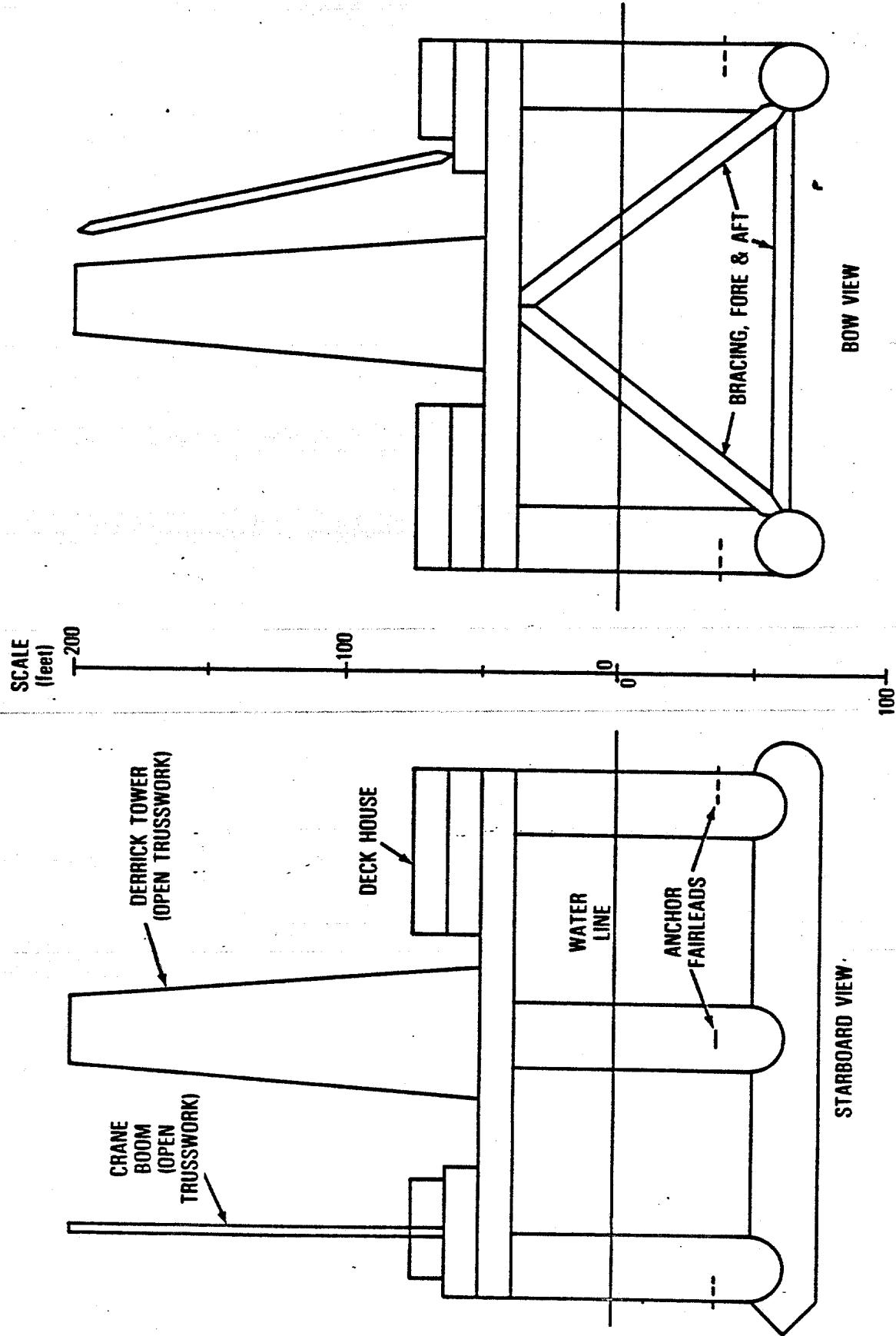


Figure 2. Scale Sketch of Semisubmersible Drilling Platform  
for Sample Problem

Table 1. Sample Rig Bill of Particulars

Figure 2 is a sketch of a hypothetical semi-submersible rig used to demonstrate the procedures for estimating environmental forces and evaluating mooring capacity. While most dimensions are realistic, they are not intended to be representative in detail. They provide a basis for demonstrating computations and approximate the scale of current drilling rigs.

| Main Deck                        | Crew Space (2 stories)          |       |              |          |
|----------------------------------|---------------------------------|-------|--------------|----------|
|                                  | Length                          | Width | Height       |          |
| Length                           | 200 ft                          |       | Length       | 62 ft    |
| Width                            | 200 ft                          |       | Width        | 62 ft    |
| Height                           | 12 ft                           |       | Height       | 24 ft    |
| Crane Base                       | Crane House                     |       |              |          |
| Length                           | 50 ft                           |       | Length       | 38 ft    |
| Width                            | 50 ft                           |       | Width        | 38 ft    |
| Height                           | 12 ft                           |       | Height       | 12 ft    |
| Derrick Tower (Trusswork)        | Crane Boom (Trusswork)          |       |              |          |
| Base                             | 50 ft sq.                       |       | Base         | 8 ft sq. |
| Top                              | 25 ft sq.                       |       | Top          | 8 ft sq. |
| Height                           | 150 ft                          |       | Length       | 138 ft   |
| Caissons (6, cylindrical)        | Footers (2, cylindrical)        |       |              |          |
| Length                           | 100 ft                          |       | Length       | 200 ft   |
| Diameter                         | 25 ft                           |       | Diameter     | 25 ft    |
| Diagonal Braces (4, cylindrical) | Lateral Braces (2, cylindrical) |       |              |          |
| Length                           | 115 ft                          |       | Length       | 150 ft   |
| Diameter                         | 10 ft                           |       | Diameter     | 10 ft    |
| Drilling Trim                    | Towing Trim                     |       |              |          |
| Draft                            | 75 ft                           |       | Draft        | 21 ft    |
| Displacement                     | 10300 LT                        |       | Displacement | 5400 LT  |
| Flooded                          | 4900 LT                         |       | Flooded      | None     |

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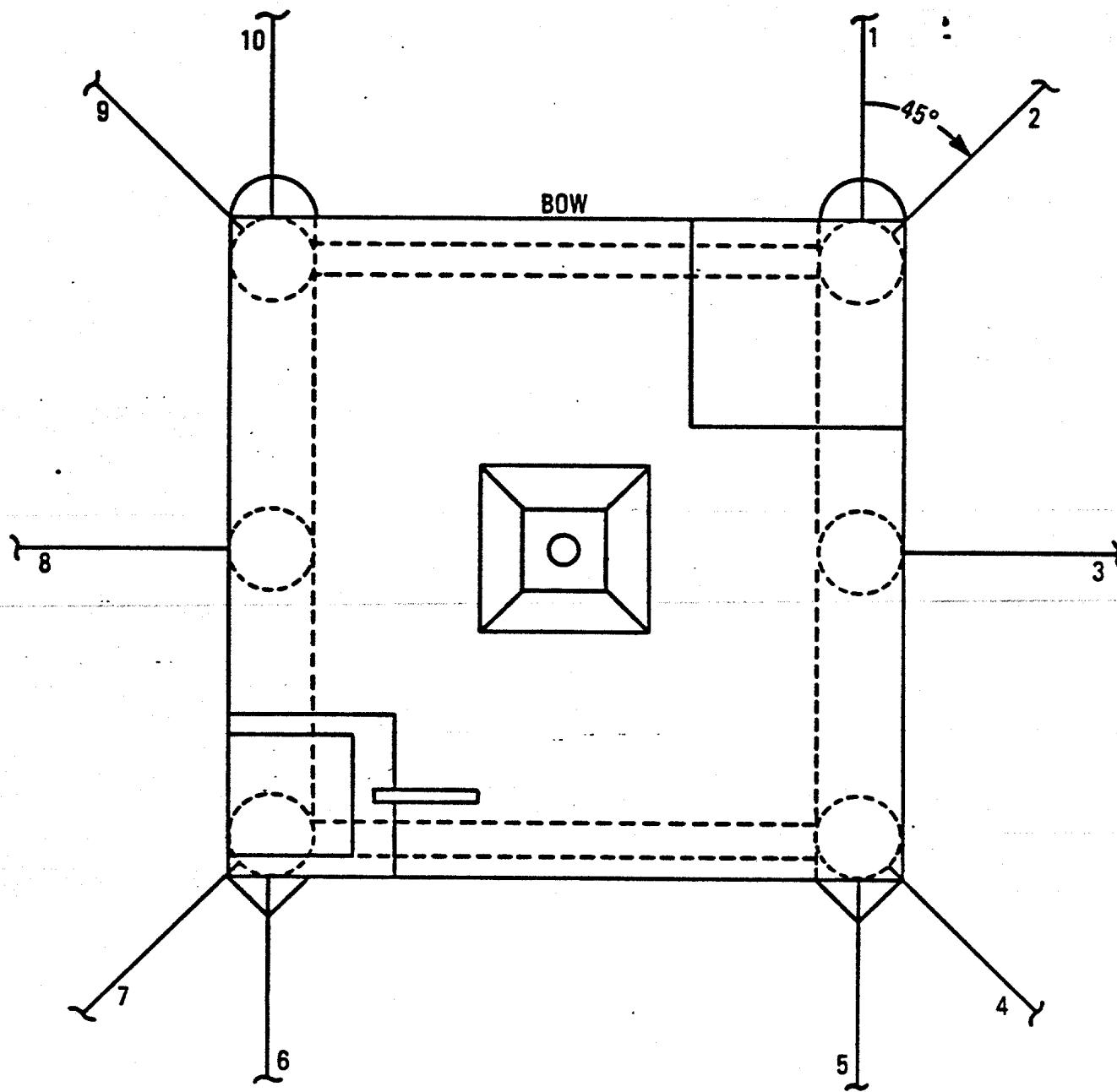


Figure 3. Sample Rig Mooring Plan

Table 2. Sample Mooring Bill of Particulars

| <u>Leg<br/>No.</u> | <u>Leg<br/>Type</u> | <u>Anchor<br/>Direction</u> |
|--------------------|---------------------|-----------------------------|
| 1                  | 1                   | 0.                          |
| 2                  | 2                   | 45.                         |
| 3                  | 3                   | 90.                         |
| 4                  | 2                   | 135.                        |
| 5                  | 1                   | 180.                        |
| 6                  | 1                   | 180.                        |
| 7                  | 2                   | 225.                        |
| 8                  | 3                   | 270.                        |
| 9                  | 2                   | 315.                        |
| 10                 | 1                   | 0.                          |

| <u>Leg Construction</u> |                        |                       |                      |                          |                          |
|-------------------------|------------------------|-----------------------|----------------------|--------------------------|--------------------------|
| <u>Leg<br/>Type</u>     | <u>Segment<br/>No.</u> | <u>Material</u>       | <u>Size<br/>(in)</u> | <u>Quantity<br/>(ft)</u> | <u>Deployed<br/>(ft)</u> |
| 1                       | 1                      | Stud-Link Chain       | 3.                   | 2250 <sup>2</sup>        | 1350                     |
| 2                       | 1                      | IWRC Wire Rope (6x37) | 3.                   | 6000                     | 4270                     |
| 3                       | 1 <sup>3</sup>         | IWRC Wire Rope (6x37) | 3.                   | 6000                     | 4800                     |
|                         | 2                      | Stud-Link Chain       | 3.                   | 540 <sup>4</sup>         | 540                      |

Note

- 1 Outboard of fairlead.
- 2 25 shots at 90 feet per shot.
- 3 Segments count from fairlead toward anchor.
- 4 6 shots at 90 feet per shot.

Anchor Selection

| <u>Style</u> | <u>Holding Capacity</u> |             |            |
|--------------|-------------------------|-------------|------------|
|              | <u>Size</u>             | <u>Sand</u> | <u>Mud</u> |
| Statos       | 15,000 lb               | 450,000 lb  | 350,000 lb |

## SECTION 1

### OSCAR<sup>1</sup>

OSCAR (Ocean System Computer Analysis Program) is a large computer program developed by Ultra Marine, Inc. that models a variety of ocean engineering situations using several methods. This versatility requires complex input to describe the physical structure as well as selection among numerous options that adapt OSCAR to the situation. This volume will discuss the static and frequency domain mooring analysis options pertaining to a semisubmersible and show how to set up the input for a semisubmersible spread mooring. The example illustrates how large computer models are used to estimate both dynamic and static responses of semisubmersibles in spread moorings. It is based on the sample mooring used throughout Volume I.

Input to OSCAR is divided into records that begin with a keyword. The keywords signal the type of data that follow and can be considered to be of two general types:

- 1) Verbs, which command the program to perform a function; and
- 2) Adjectives, which describe the situation being analyzed.

Free field input is used, meaning the data does not have to be placed in specific columns. Instead, values are separated by either a comma or as many blanks as desired. The order of the entries is important, however. Records longer than 80 characters are divided into multiple lines by putting a plus sign (+) as the last entry on a line. Alphanumeric names may have up to 8 characters.

OSCAR is divided into many different data input and situation analysis modules. The relevant modules for moored semisubmersibles are vessel input, hydrostatics, and mooring.

Floating bodies can be defined to OSCAR as vessels or jackets. "Jacket" refers to the tubular structure erected at an offshore oil production site. A semisubmersible exploration rig could be modeled as a floating jacket but the vessel module is used for two reasons. First, by using the vessel module the user can specify override values for wind, current profile, areas and centers of pressure. This enables a simpler description of the body since only the major hydrodynamic members need be considered. Second, there is a bug in OSCAR's printout routine for environmental forces of the jacket module, although internally the computed forces are correct. The problem is insignificant because OSCAR allows jacket-like structures to be described using the vessel input mode. The only inconvenience is a few extra input records. Following the wording used in the OSCAR manual, "jacket" refers to a semisubmersible rig in this manual.

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1. User's Information for OSCAR," Rev. 26.0, Ultramarine, Inc., 1985.

## COORDINATE SYSTEMS

The OSCAR manual describes several coordinate systems. Some of them are transparent to users who adhere strictly to the following rules:

1. The local jacket system has its origin on the baseline (keel), at the centerline, and at the bow. Positive X is toward the stern, positive Y to starboard, and positive Z up. This coordinate system locates objects on the rig. The system moves with the rig. All mooring line attachment points are in the local jacket system.
2. The origin of the global system lies on the still water surface. The global axes are parallel to the local axes when no external loads disturb the rig in its mooring, and the global origin is directly over the origin of the jacket system. Global coordinates track rig motions.
3. The position of each anchor is described in its own cylindrical coordinate system centered in its attachment to the rig. Anchor depth is input in feet below the surface. Distance to the anchor is input as a horizontal radius in the still water plane from the attachment to a point above the anchor. Direction to the anchor is measured from the X-axis (positive astern), counterclockwise to the radius anchor distance.

## UNITS

The default units, which are used in this example, are feet, inches and kips (1000 lbs). The defaults can be changed using a DIMEN record.

## SAMPLE PROBLEM

Figure 1-1 shows how a semisubmersible drilling platform is depicted to OSCAR as a set of skeletal elements connected at node points. The example is based on the sample problem introduced in Volume I. The main deck is represented as a flat plate element and caissons, footers and braces are represented as linear elements. A detailed description of the OSCAR model for the sample problem is in the next section.

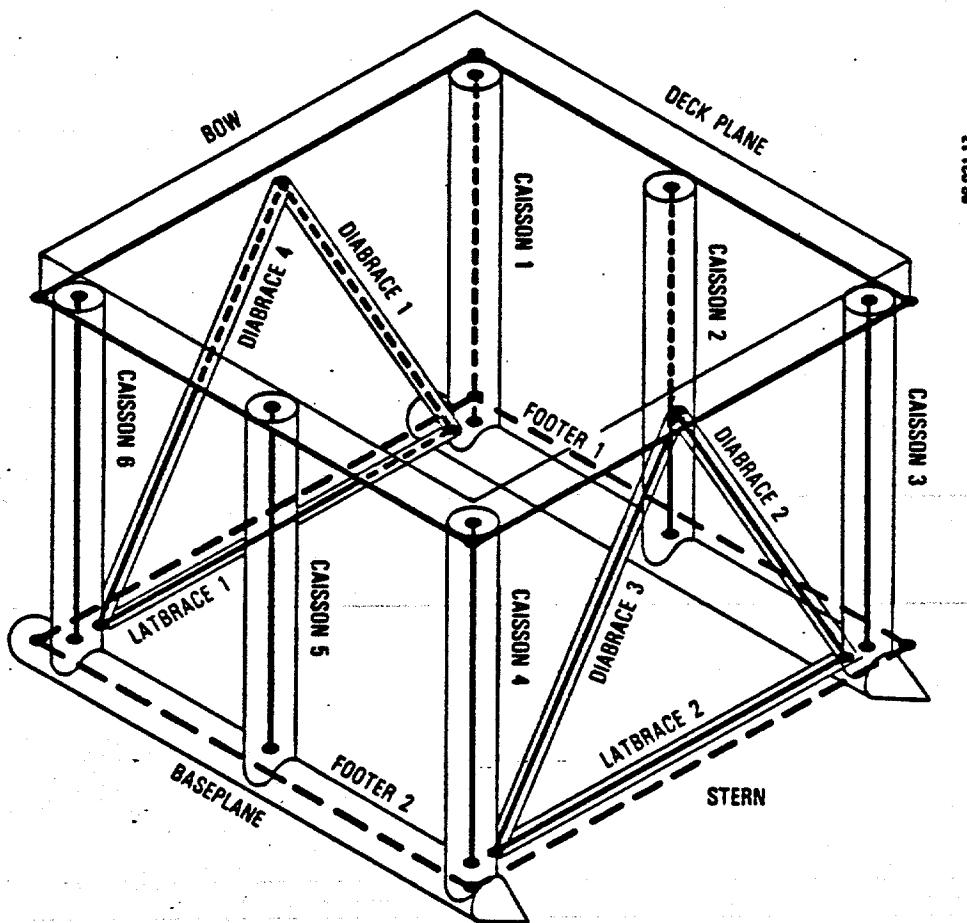
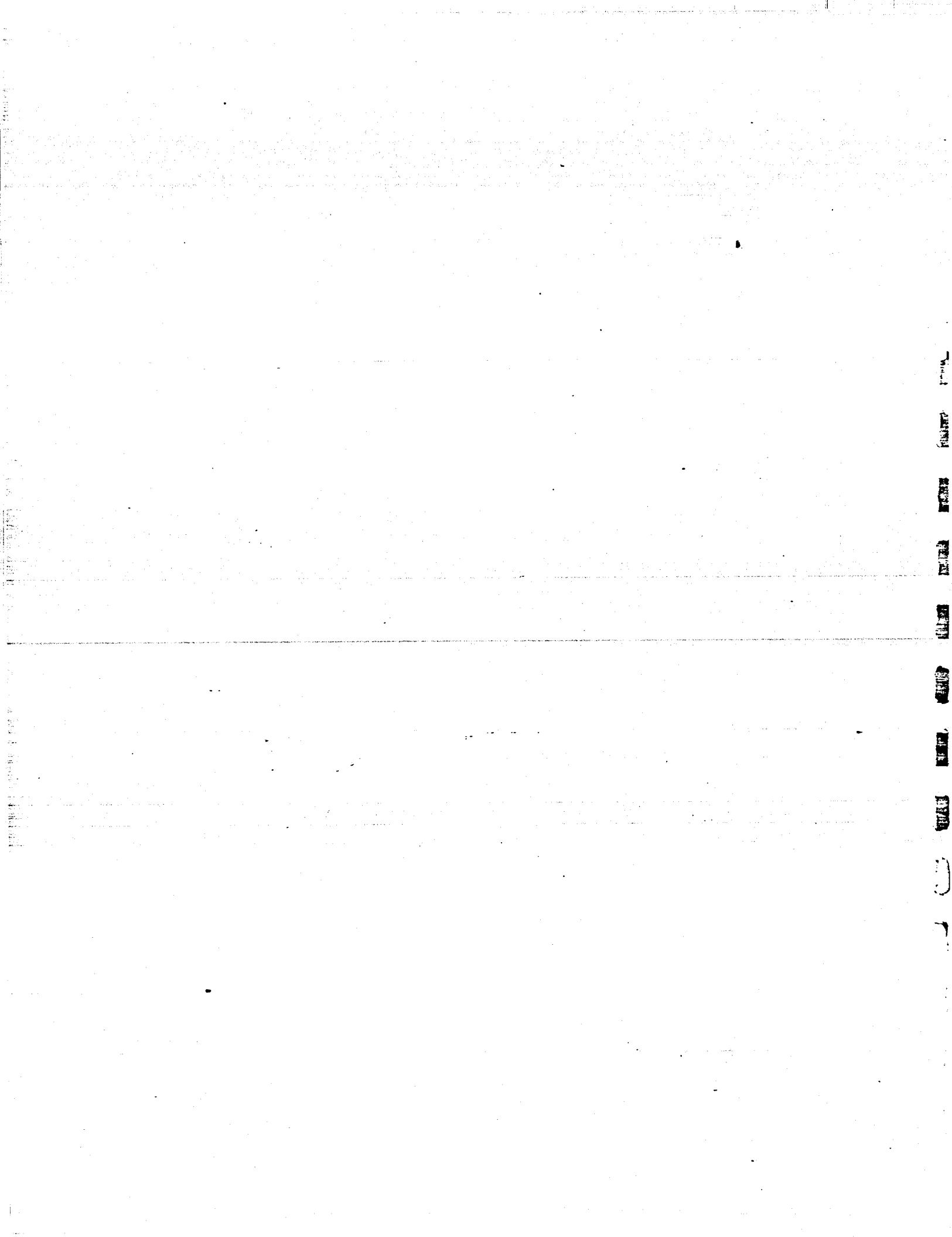


Figure 1-1. An OSCAR Model for A Semisubmersible Drilling Platform



## SECTION 2

### SAMPLE INPUT

Refer now to Appendix A, which lists the entire job input deck for the sample problem. The comments in the right column of the table are not part of the input. Part I of the listing consists of job control statements unique to the computer system running OSCAR. The remainder of the input for this example is echoed on pages 2, 3 and 4 of OSCAR's printout, Appendix B.

The first record is a TITLE record and the last record, END DATA, signals the end of the data. The remaining records can be divided into two main groups: situation analysis, which includes both the environment and the mooring as external influences on the floating object, and vessel description, which is a mathematical listing of the floating body. The analysis records run from the CFORM record through the END MOORING record. The vessel description falls between the VESSEL and END VESSEL records. Vessel details may be stored in a separate computer file or appended to the vessel description, as illustrated.

#### Situation Analysis

Hydrostatics. The only hydrostatics record present is the CFORM record. This record causes curves of form results to be generated. The CFORM record parameters are:

DI = First draft at which results will be printed, ft;  
DINC = Increment in draft, ft.;  
ND = Number of drafts at which results will be produced;  
TA = Trim angle; and  
RA = Roll angle.

The hydrostatics calculation is not strictly necessary to perform a mooring analysis. However, certain variables may not be initialized if this module is not called and subsequent mooring printout may have erroneous printed values when, in fact, the internal variable and computations were correct.

Mooring. The mooring description begins with the MOORING record and end with the END MOORING record. The first record is the BCOND record which sets up the conditions for each body in the system. It has the form:

BCOND, BNAME, DRAFT, TRIM, CG, LENG, BEAM  
where:

BNAME = Body name;  
DRAFT = Body draft, ft, at the local body origin;  
TRIM = Trim angle, deg;  
CG = Local Z coordinate of the CG, ft;  
LENG = Body length, ft; and  
BEAM = Body beam, ft.

If the body has been defined by a detailed description, as in this case, LENG and BEAM are set to the internally computed values.

Wind and Current BWIND and BCUR records can be used to override the calculated pressure areas and drag coefficients. These records permit a simplified element model that retains major hydrodynamic properties below the waterline but is not detailed above it. The BWIND record's form is:

BWIND, BNAME, WAX, WAY, WCDXM WCDY, WCPX, WCPY, WCPZ

where:

|                  |  |
|------------------|--|
| BNAME            | = Body name;                               |
| WAX, WAY         | = X and Y wind areas, ft <sup>2</sup> ;    |
| WCDX, WCDY       | = X and Y direction drag coefficients; and |
| WCPX, WCPY, WCPZ | = Local X, Y, Z center of pressure         |

The BCUR record has the same form but all the values relate to current drag. In the sample case, the environmental force is known, a value of 1 is assigned to the drag coefficients, and an appropriate area to generate the force is used.

The BINERTIA record is used to set the body X, Y, and Z radii of inertia in feet.

Anchor Legs Three types of data records are used to define the mooring lines used in this example. LDEF records define line types, ALINE records characterize mooring pattern, and ANCLOCH records specify preloads. This example has three line types: chain, wire, and wire plus chain, so three LDEF records are used. No springs or clumps are used. The LDEF record has the form:

LDEF, TYPE, DEPTH, SLOP, KE(1), KE(2), L(1), W(1), AE(1), CW(1),  
L(2), W(2), AE(2), CW(2), . . .

where:

LTYPE = Up to 8 character name of this line type;  
DEPTH = Vertical depth (ft) from waterplane to anchor;  
SLOP = Slope of the bottom from vessel to anchor, ft/ft  
(positive if depth increases toward anchor);  
KE(1) = Characteristics of springs attached to end of the  
KE(2) line. Stretch in spring, DEL, due to force F is  
given by:  $DEL = (KE(1) + F * KE(2)) * F$ ;  
L(I) = Length in ft of Ith segment of line;  
W(I) = Wt per ft in water of line;  
AE(I) = Cross section area X Young's Modulus;  
CW(I) = Clump weight in water (kips), connected between  
segments I and I+1.

ALINE records define the mooring pattern by an attachment point on the vessel, an angle at which the line radiates outward, and the horizontal distance between the anchor and the attachment point. The horizontal distance can be readjusted in order to produce a specified preload in the line. The form of the ALINE record is:

ALINE, LNAME, BNAME, LTYPE, XA, YA, ZA, THET, DTA.

where:

LNAME = 1 to 8 character name for the line;  
BNAME = Body or anchor name to which this line is attached;

**LTYPE** = Name of the line type, for this example either WIRE,  
 CHAIN, or WIRECHAI;  
**XA, YA, ZA** = Fairlead location in the local coordinate system  
 attached to the rig;  
**THET** = Direction in degrees from the fairlead to the  
 anchor. Angles are measured counterclockwise from  
 the positive X axis (astern).  
**DTA** = Distance to Anchor from attachment point, measured  
 in a horizontal plane;

In order to establish an initial configuration, preloads are applied. The anchor positions are then altered along the radial direction to obtain these preloads. The ANCLOCH record provides these preloads and its form is:

**ANCLOCH, LN(1), F(1),..., LN(I), F(I),..., LN(N), F(N)**

where **LN(I)** = Name of Ith line whose anchor is to be moved;  
**F(I)** = Horizontal component of tension in line I; and  
**N** = Number of anchor legs.

Other records comparable to the ANCLOCH record exist. These can alter line lengths instead of anchor positions or use the actual line tension and not its horizontal component. They are described in the OSCAR users manual.

Analysis Control. These records apply the environment and perform the mooring analysis. The environment can be considered to consist of a static current and wind force plus a dynamic oscillating wave force. The net wave drift will be zero for a jacket under Morison's equation. The analysis method applies steady state environmental forces, computes an equilibrium position, and then applies dynamic wave forces. The full environment for the sample problem has a 1 knot current, a 50 knot wind, and an ISSC wave spectrum with 40 ft significant wave height and a 12 second mean period.

A case is set up for analysis by selecting external force, response constraint, and analytic method options. Each case begins with an ENVIRONMENT record and ends with an analysis directive. Cases may be linked by a RESET record, which uses the state of the mooring at the end on one case as initial condition for the next case. The usual procedure is to develop an equilibrium condition and then proceed to dynamic loading.

For large environmental forces, a stepping procedure to help OSCAR converge to a solution when the final position is significantly different than the initial position. This stepping procedure is most efficient when the model starts with one degree of freedom and degrees of freedom are added singly by using a sequence of ENVIRONMENT ... RESET directives. In the sample problem, the rig is first allowed only translation downwind, then the translation is corrected for heave, and this is corrected for pitch.

The first ENVIRONMENT record sets the environment to be analyzed. It's form is:

**ENVIRONMENT, VC, CURD, SHEIG, SP, SDIR, STYPE, WVEL, WDIR**

where:

**VC** = Surface current, ft/sec;

CURD = Direction from which the current comes, degrees.  
Zero means the current flows from stern to bow;  
SHEIG = Significant wave height, feet;  
SP = Mean period of the sea, seconds;  
SDIR = Direction from which the sea comes, degrees;  
STYPE = Type of sea state: REGULAR (Regular waves),  
PM (Pierson-Moskowitz), ISSC, or JONSWAP;  
WVEL = Wind velocity, knots; and  
WDIR = Direction from which the wind blows.

The CURPROF record sets the current profile. It consists of a set of velocities and corresponding water depths. In this case only one pair is entered since the current is uniform.

The WAVEDRIFT record sets the waveldrift computation method. SEMI indicates semisubmersible.

The RAO record zeroes all response amplitude operators. This record is optional and was included in the sample problem simply to make sure no wave forces were included.

NITER sets the number of iterations permitted to find an equilibrium position. The default value is 50; 100 were allowed for the sample problem.

The DOFDEL record deletes degrees at freedom. The first DOFDEL record deletes all but surge. Later DOFDEL records will be used to add degrees of freedom one at a time as described above.

EQUI directs OSCAR to find the equilibrium position resulting from the applied environment. Once this position has been found, the RESET command resets OSCAR to use the computed equilibrium as the initial configuration for the next EQUI analysis. In the sample problem, three consecutive EQUI analyses are performed, adding one degree of freedom each time. Since the environment has been defined as to come from the stern, only surge, heave, and pitch need be considered.

The final EQUI set in the sample problem has two additional records. The TABLE record causes a table of force vs displacement values to be printed out for each named line. The three legs named correspond to the three different line types. The COMPRAO record initiates a frequency domain analysis. The output consists of vessel RAO's and statistical summaries of vessel motions and line tensions. This record overrides the previous RAO record.

The END MOORING record ends the description of the mooring and its analysis. The remainder of the input describes the drilling rig.

#### Vessel Description

A semisubmersible can be described as a jacket composed of long tubular members. Hydrodynamically, these are modeled as Morison elements, producing no wave drift force, among other properties. Using Morison elements simplifies the mathematical computations without seriously affecting the accuracy (or inaccuracy) inherent in frequency domain analyses.

The vessel description is begun with a VESSEL record. The VESSEL record contains the vessel name (JACKV), the drift force computation method (here, SEMI), and the hydrodynamic theory to be used (STRIP). In this case the entire vessel uses Morison elements, so the STRIP parameter is ignored.

The next record, INJACK, states that jacket type input will follow. The NONE parameter means that the input is not in a separate computer file, but is appended to the vessel description. Two print parameters, MRP and MGRP, regulate printout for members and a summary for group types.

The END VESSEL description ends the vessel description and the remaining records are the jacket input formats. There will normally be other records appended to the vessel description (hulls, stations, etc.) but this vessel is completely described as a jacket.

#### Jacket Description

The jacket description defines the shape and structural properties of the rig. In a jacket model, the structure is defined by a spiderweb of members inter-connected at joints. This technique is common among finite element programs such as NASTRAN. The user has a variety of member types available but for a semisubmersible the two primary ones are plates and tubes.

This particular model is composed of 30 joints and 15 members, 14 tubular and one plate. Figure -1 is a diagram of the joints and members used to describe the rig sketched on Figure 1-1.

The Joint List. The form of the JOINT record is:

JOINT, JNAME, X, Y, Z

where JNAME = 1 through 8 character joint name and  
X, Y, Z = local jacket coordinates for that point.

For this model, the joint names have been chosen to reflect their usage. For instance CAISL1 is the lower joint for caisson number 1 and CAISU1 is its upper joint. Similar names apply to joints for the braces, footers, and deck.

Four joints are named by the JJLEG record. The first four JOINT records locate them in local coordinates. Use the following rules to select and identify the named joints (Rule 1 repeats the definition of local jacket coordinates for convenience):

1. The local jacket system has its origin on the baseline (keel), at the centerline, and at the bow. Positive X is toward the stern, positive Y to starboard, and Z up. The system moves with the rig.
2. The four coordinate joints form a rectangle in the baseline plane. The baseline plane is the XY-plane in local coordinates.
3. Two of the points have zero X coordinates and Y coordinates of

opposite sign: (0,N,0) and (0,-N,0). 2N usually equals the beam.

4. The remaining two points have the same X coordinate and  $\pm$  Y coordinates of the above points: (M,N,0) and (M,-N,0). M usually equals the vessel length.
5. The order of names on the JLLEG record must be aft starboard, bow starboard, aft port, bow port: (M,N,0), (0,N,0), (M,-N,0), (0,-N,0).

The named joints for the sample problem (Table -) follow these rules, although the order of names in the JJLEG list differs from the order of the named JOINT records.

Joints may be defined that have no members connected to them. However, members must have joints as endpoints.

The Member List. The two types of members used to describe the vessel are tubes and plates. The LMEN<sup>T</sup> tubular element produces weight, buoyancy, added inertia, wind load, and hydrodynamic drag. It is modeled as a tube with thickness and a specified outside diameter. JPLATE elements produce similar loads and are modeled as flat, polygonal plates with a specified thickness. All members are assumed to be of steel unless changed via override parameters.

Elements that form major sub-structures are grouped together and named to clarify the input. A CLASS record is used to name each group. The first class in the sample problem (Table -) is the deck and contains one JPLATE element. The form of the JPLATE record is:

JPLATE, t, JNAM(1), . . . , JNAM(I), . . . , JNAM(N)

where t = plate thickness in inches, and

JNAM(I) = Name of the Ith joint forming a plate corner. There may be 3 or 4 joint names but the names must be in the order that the joints would be encountered as one traverses the plate edge.

There is an option list which includes setting the plate weight but they are not used in the sample problem. Instead, the plate thickness was estimated to model an appropriate weight of the sample rig.

The next class is the caissons, represented by tubular elements. The NAME,ON record requires that each LMEN<sup>T</sup> record have a specific name. The form of the LMEN<sup>T</sup> record is:

LMEN<sup>T</sup>, NAME, JNAMA, JNAMB, OD, t

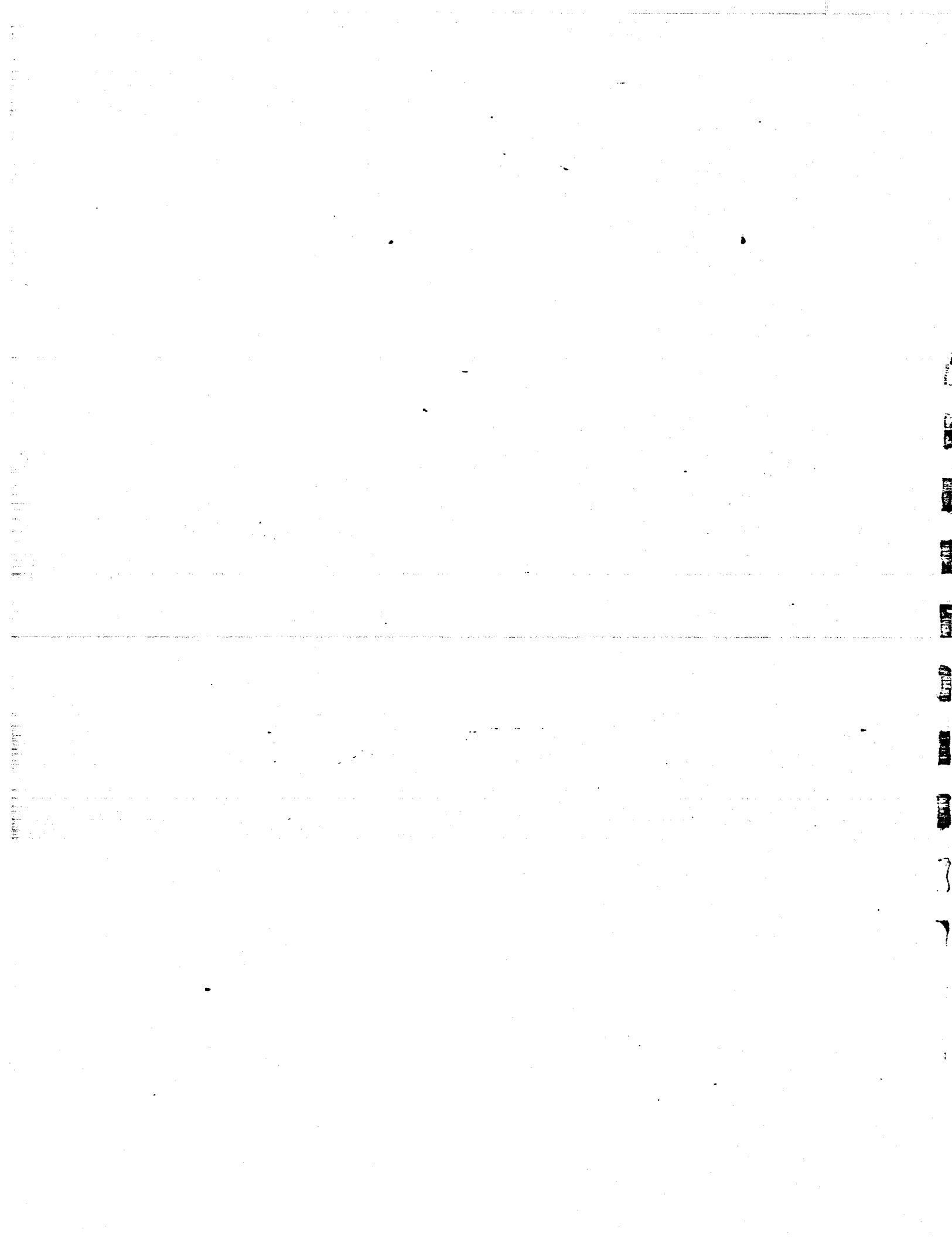
where:

NAME = Caisson name, 1-8 characters, if names are required;  
JNAMA = One end joint of the element;  
JNAMB = Remaining end joint;  
OD = Outside diameter in inches; and  
t = Wall thickness in inches

Again, there is an option list that is not used here.

The remaining classes, FOOTER, LATBRACE, and DIABRACE are set up in an identical manner to the CAISSON class. Each class consists of LMEN<sup>T</sup> tubular elements.

The final record, MAXLENGTH 10, changes the default integration length for computing drag forces on tubular elements. The default is 20 feet.



### SECTION 3

#### DISCUSSION OF PRINTOUT

Appendix B is the printout of the sample problem. The discussion is keyed to page numbers at the top left hand corner of the computer printout.

| <u>Pages</u> | <u>Comment</u>  |
|--------------|---|
| 2-4          | Images of the input data records.   |
| 5-6          | Jacket member summary. Coordinates are in the local body system. The offset option has not been used. See options for the LMENT record for offset details.                            |
| 7            | Jacket class summary. Classes are defined via the CLASS record.   |
| 8-9          | Definitions of the major physical characteristics of the jacket and drag coefficient information.   |
| 10           | Lists the analysis options requested.   |
| 11           | Lists environmental conditions currently in force.  |
| 13-14        | Lists hydrostatic properties at drafts requested by the CFORM record. The wetted surface calculation has a bug in it and is not correct. Metacentric height GM = KM-KG                |
| 15           | Summarizes the body characteristics for the mooring module.   |
| 16           | Mooring line type summary. A result of the LDEF records.  |
| 17-18        | Repeats of pages 15 and 16.   |
| 20-21        | Added inertia and damping coefficients for the body at various frequencies. Note that for Morison elements the added inertia terms are frequency independent and the damping is zero. |
| 22-31        | Wave excitation at various encounter frequencies and headings. Units are feet and degrees. Wave drift forces for head and beam seas, computed as zero for Morison elements.           |
| 32-33        | Mooring line properties. The anchor positions were computed to produce the required pretension, specified on the ANCLOCH records.   |
| 34           | The initial configuration with no applied environment. The active length (that is, arc length of the suspended catenary) agrees with the corresponding value obtained by RIGMOOR.     |
| 35           | Listing of the applied environment.   |
| 36           | Forces on the body from the environment.  |

| <u>Pages</u> | <u>Comment</u>  |
|--------------|---|
| 37-38        | Mooring results including location of the body, line tensions, and active line lengths. Remember that all degrees of freedom except surge have been locked out for the first iteration. Active lengths agree with lengths from RIGMOOR X <u>vs</u> H listings.  |
| 39           | Redefines the initial configuration as the present configuration.   |
| 41-45        | Second equilibrium iteration with surge and heave to be included. Wind load was scaled back from the 70 knot operational gale shown on Table 3-2 because the corresponding seas would not pass under the semisubmersible deck. Wind force was scaled to 50 knots in the OSCAR problem.                                      |
| 46-51        | Third iteration to include surge, heave, and pitch. The model is now ready to receive the wave forces.  |
| 52-54        | Listing of displacement <u>vs</u> horizontal force for each of the three line types. Produced by the TABLE record.  |
| 55-58        | Repeat of 46-51 since the steady state environment is the same.   |
| 59           | Vessel RAO's over a range of frequencies. The effects of the mooring lines are included in these results.   |
| 60           | Statistics of the body motions in the irregular ISSC spectrum. These motions are oscillations about the static offset due to the steady state wind and current loads. Since no lateral forces were defined in the input, there should be no sway, roll, or yaw. The small values shown result from computational round-off. |
| 61           | Statistics of the line tension variation. Note that there is a higher variation in the stern lines since these are under a higher tension due to the steady state deflection.   |

**APPENDIX A**

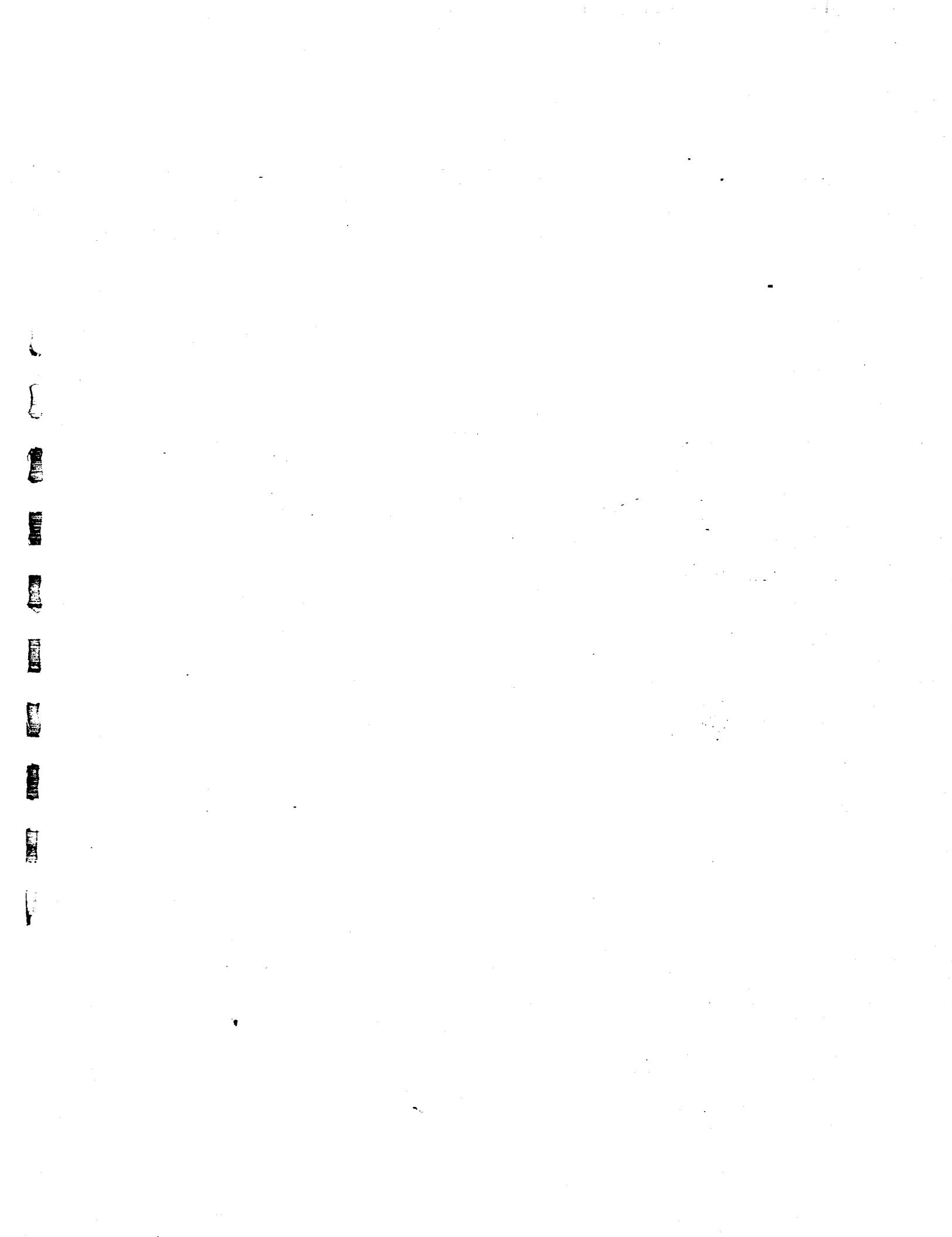
**Input Records to Run Sample Problem  
Using OSCAR Computer Model on Commercial Timesharing Net**

| <u>Input Record</u>  | <u>Comment</u>   |
|--|--|
| /JOB<br>OSCAR,T500,P4,CM377000.<br>USER,_____,_____,_____.<br>NOEXIT.<br>GET,ULTRA/UN=VSSLIB.<br>BEGIN,OSCAR,ULTRA.<br>ENQUIRE,R.<br>DAYFILE.<br>REWIND,OUTPUT.<br>PACK,OUTPUT.<br>COPYEI,OUTPUT,OUT.<br>REPLACE,OUT.<br>/EOR  | Part I.      Batch jobstream commands<br>Set resource limits<br>Identify user for billing<br><br>Load OSCAR from library<br>Start OSCAR<br><br>Request session log<br>Store results  |
| TITLE SEMISUBMERSIBLE MOORING<br>CFORM 75 1 1 0 0<br>MOORING<br>BCOND JACKV 75 0 50 200 200<br>BWIND JACKV 17511 17600 1 1 0 0 147<br>BCUR JACKV 11885 19500 1 1 0 0 37<br>BINERTIA JACKV 75 75 75<br>LDEF CHAIN 350 0 0 0 1349 78 77360000 0<br>LDEF WIRE 350 0 0 0 4270 14.48 57960000 0<br>LDEF WIRECHAI 350 0 0 0 4790 14.48 57960000 0 540<br>ALINE LEG1 JACKV CHAIN 0 88 37 180 1281<br>ALINE LEG2 JACKV WIRE 4 96 37 135 4247<br>ALINE LEG3 JACKV WIRECHAI 100 100 37 90 5316<br>ALINE LEG4 JACKV WIRE 196 96 37 45 4247<br>ALINE LEG5 JACKV CHAIN 200 88 37 0 1281<br>ALINE LEG6 JACKV CHAIN 200 -88 37 0 1281<br>ALINE LEG7 JACKV WIRE 196 -96 37 -45 4247<br>ALINE LEG8 JACKV WIRECHAI 100 -100 37 -90 5316<br>ALINE LEG9 JACKV WIRE 4 -96 37 -135 4247<br>ALINE LEG10 JACKV CHAIN 0 -88 37 180 1281<br>ANCLOCH LEG1 100.397 LEG2 100.397<br>ANCLOCH LEG3 100.397 LEG4 100.397<br>ANCLOCH LEG5 100.397 LEG6 100.397<br>ANCLOCH LEG7 100.397 LEG8 100.397<br>ANCLOCH LEG9 100.397 LEG10 100.397<br>ENVIRONMENT 1.689 0 0 0 0 ISSC 50 0<br>CURPROF 1.689 350<br>WAVEDRIFT SEMI<br>RAO JACKV 0 0 0 0 0<br>NITER 100<br>DOFDEL JACKV SWAY HEAVE ROLL PITCH YAW<br>EQUI | Part II.      Name Sample<br>Hydrostatics<br>Start Mooring Subdeck<br>Rig conditions<br>Wind conditions<br>Current conditions<br>Rig radii of inertia<br>LEG type 1 (Legs 1,5,6,10)<br>2 (Legs 2,4,7, 9)<br>3 (3,8)<br>Describe ten anchor legs<br>LEGn: Leg name<br>JACKV: Vessel name<br>WIRE: Leg type name<br>200: X ] Components of<br>-88: Y ] fairlead posi-<br>37: Z ] tion on JACKV<br>-90: Direction, fairlead<br>to anchor<br>1281: Anchor radius<br>List<br>Horizontal<br>Preload<br>by<br>Leg Define<br>Deflect --- Analyses ---<br>mooring<br>in surge<br>only<br>to<br>new<br>Equilibrium |

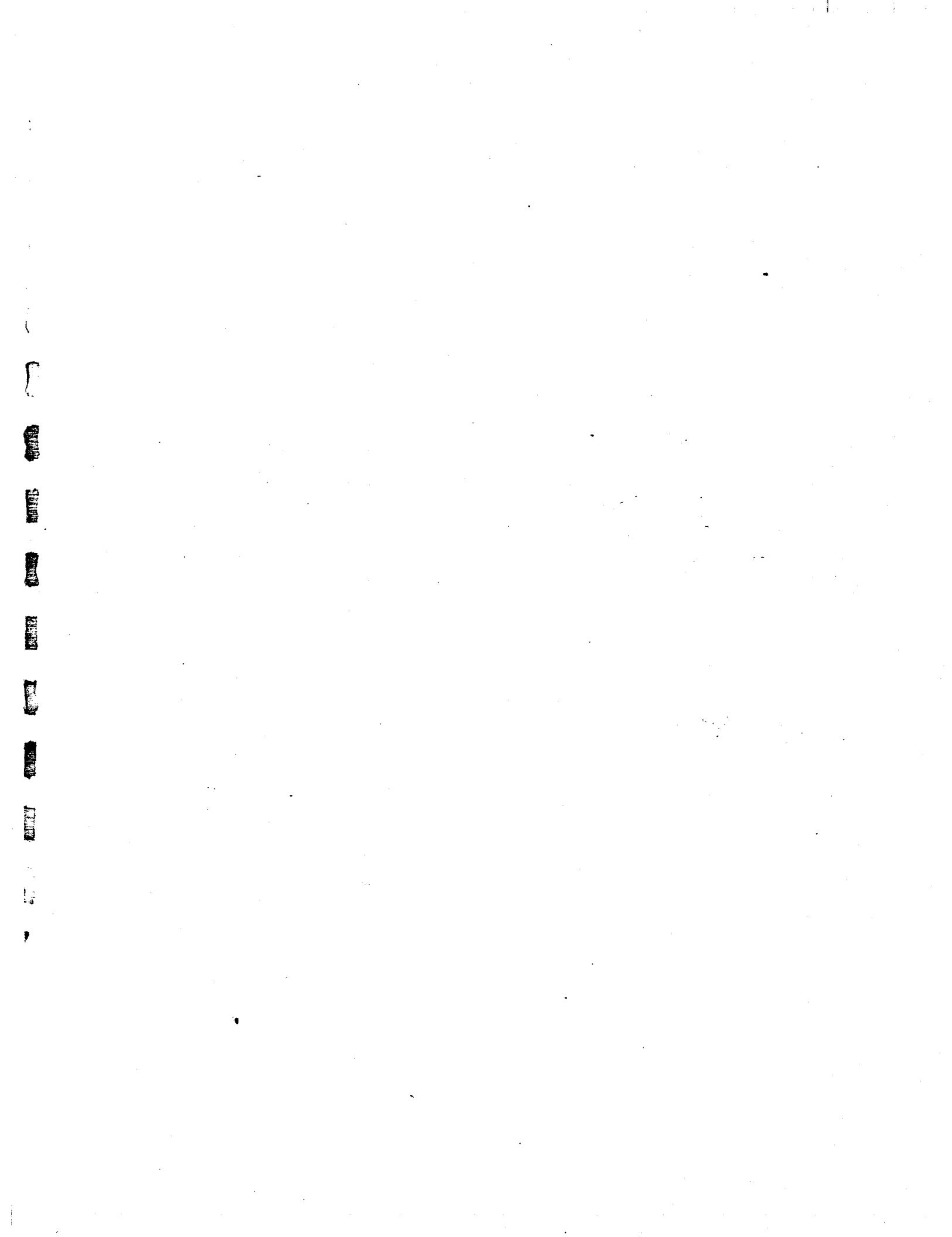


Input Record

| Comment                 | Class Deck                | Jplate 3.13 DECK1 DECK2 DECK3 DECK4 | NAME, ON<br>CASSISSON  | IMEMT CAISSON1 CAISL1 CAISU1 300 6<br>IMEMT CAISSON2 CAISL2 CAISU2 300 6<br>IMEMT CAISSON3 CAISL3 CAISU3 300 6<br>IMEMT CAISSON4 CAISL4 CAISU4 300 6<br>IMEMT CAISSON5 CAISL5 CAISU5 300 6<br>IMEMT CAISSON6 CAISL6 CAISU6 300 6<br>CLASS FOOTER<br>IMEMT FOOTER1 FOOT1 FOOT2 300 6<br>CLASS FOOTER<br>IMEMT FOOTER2 FOOT3 FOOT4 300 6<br>CLASS LATBRACE<br>IMEMT LATBRAC1 BRACE6 BRACE2 120 3<br>CLASS DIABRACE<br>IMEMT DIABRAC1 BRACE6 BRACE1 120 3<br>IMEMT DIABRAC2 BRACE2 120 3<br>IMEMT DIABRAC3 BRACE1 BRACE3 120 3<br>IMEMT DIABRAC4 BRACE4 BRACE5 120 3<br>MAXILENGTH 10<br>END DATA |
|-------------------------|---------------------------|-------------------------------------|--|--|
| Deck and superstructure | Plates thickness, corners | 6 Classes                           | Six tubular caissons:  | Names of end joints<br>and joints -<br>outside diameter, in.<br>and wall thickness   |
|                         |                           |                                     | IMEMT CAISSON2 CAISL2 CAISU2 300 6<br>IMEMT CAISSON3 CAISL3 CAISU3 300 6<br>IMEMT CAISSON4 CAISL4 CAISU4 300 6<br>IMEMT CAISSON5 CAISL5 CAISU5 300 6<br>IMEMT CAISSON6 CAISL6 CAISU6 300 6                                       |  |
|                         |                           |                                     | CLASS FOOTER<br>IMEMT FOOTER1 FOOT1 FOOT2 300 6<br>CLASS FOOTER<br>IMEMT FOOTER2 FOOT3 FOOT4 300 6<br>CLASS LATBRACE<br>IMEMT LATBRAC1 BRACE6 BRACE2 120 3<br>CLAS   |  |
| 2 Footer separators     | 2 Footer                  |                                     | IMEMT CAISSON1 CAISL1 CAISU1 300 6<br>IMEMT CAISSON2 CAISL2 CAISU2 300 6<br>IMEMT CAISSON3 CAISL3 CAISU3 300 6<br>IMEMT CAISSON4 CAISL4 CAISU4 300 6<br>IMEMT CAISSON5 CAISL5 CAISU5 300 6<br>IMEMT CAISSON6 CAISL6 CAISU6 300 6 |  |
| 4 Diagonal braces       | 4 Diagonal braces         |                                     | CLAS   |  |
|                         |                           |                                     | IMEMT LATBRAC2 BRACE3 BRACE5 120 3<br>IMEMT DIABRAC1 BRACE6 BRACE1 120 3<br>IMEMT DIABRAC2 BRACE2 120 3<br>IMEMT DIABRAC3 BRACE1 BRACE3 120 3<br>IMEMT DIABRAC4 BRACE4 BRACE5 120 3<br>MAXILENGTH 10<br>END DATA                 |  |
| IntegratIon step, feet  | End of OSCAR input        |                                     |  |  |



**SAMPLE PROBLEM**  
**OF**  
**RESULTS OF DYNAMIC ANALYSIS**  
**APPENDIX B**



B  
1

ENTERING INPUT MODULE

\*\*\* CSCAF \*\*\*

DATE 65/12/09

## IMAGES OF DATA CARDS

## TITLE SEMIINVERISIBLE MUDRING

CFORM 751100

HODRING

BCONC JACKV 75 C 5C 200 200

BWIND JACKV 17511 17600 11 0 0 147

BCUR JACKV 11885 19500 11 0 0 37

BINERTIA JACKV 75 75 75

LDEF CHAIN 350 0 0 0 1349 78 77260000 0

LDEF WIFECHAI 350 0 0 0 4270 14 48 57960000 0

ALINE LEG1 JACKV CHAIN 0 88 37 180 1281

ALINE LEG2 JACKV WIRE 4 96 37 135 4247

ALINE LEG3 JACKV WIRECHAI 100 1C0 37 90 5316

ALINE LEG4 JACKV WIRE 196 96 37 45 4247

ALINE LEG5 JACKV CHAIN 200 88 37 0 1281

ALINE LEG6 JACKV CHAIN 200 -88 37 0 1281

ALINE LEG7 JACKV WIRE 196 -96 37 -45 4247

ALINE LEG8 JACKV WIRECHAI 100 -100 37 -90 5316

ALINE LEG9 JACKV WIRE 4 -96 37 -135 4247

ALINE LEG10 JACKV CHAIN 0 -88 37 180 1281

ANCLDCH LEG1 10C .397 LEG2 100 .397 LEG3 100 .397 LEG4 100 .397 LEG5 100 .397

ANCLDCH LEG6 10C .397 LEG7 1C0 .397 LEG8 100 .397 LEG9 100 .397 LEG10 100 .397

ENVIRONMENT 1.689 0 0 0 ISSC 50 0

CURPROF 1.689 350

WAVEDRIFT SEMI

DOFDL JACKV SWAY ROLL PITCH YAW

EQUI

RESET

ENVIRONMENT 1.689 0 0 0 ISSC 50 0

CURPROF 1.689 350

WAVEDRIFT SEMI

DOFDL JACKV SWAY ROLL PITCH YAW

EQUI

RESET

ENVIRONMENT 1.689 C 40 12 0 ISSC 50 0

CURPROF 1.689 350

WAVEDRIFT SEMI

DOFDL JACKV SWAY ROLL PITCH YAW

EQUI

RESET

ENVIRONMENT 1.689 C 40 12 0 ISSC 50 0

CURPROF 1.689 350

WAVEDRIFT SEMI

DOFDL JACKV SWAY ROLL PITCH YAW

EQUI

RESET

ENVIRONMENT 1.689 C 40 12 0 ISSC 50 0

CURPROF 1.689 350

WAVEDRIFT SEMI

DOFDL JACKV SWAY ROLL PITCH YAW

EQUI



PAGE 4

\*\*\*\*\*  
\* SEMISUBMERSIBLE MODLING  
\*\*\*\*\*

\*\*\*\*\* CSCAR \*\*\*\*\*

DATE 85/12/09

\*\*\*\*\*  
\* IMAGES OF DATA CARDS  
\*\*\*\*\*

```
CLASS FOOTER
LMENT FOOTER1 F0011 F0012 300 6
LMENT FOOTER2 F0013 F0014 300 6
CLASS LATBRACE
LMENT LATBRAC1 BRACE6 BRACE2 120 3
LMENT LATBRAC2 BRACE3 BRACES 120 3
CLASS DIABRACE
LMENT DIABRAC1 BRACE6 BRACE1 120 3
LMENT DIABRAC2 BRACE1 BRACE2 120 3
LMENT DIABRAC3 BRACE3 BRACE4 120 3
LMENT DIABRAC4 BRACE4 BRACES 120 3
MAXLENGTH 10
END DATA
```

\* 004 OSCAP \*\*\*  
 \* SEMISUBMERSIBLE MOORING

DATE 05/12/09

## JACKET MEMBER SUMMARY

| MEMBER EXTREMITIES |          |        | MEMBER PROPERTIES |                        |                    |
|--------------------|----------|--------|-------------------|------------------------|--------------------|
| NAME               | CLASS    | JOINT  | OFFSET (FEET)     | END COORDINATES (FEET) | LENGTH (FEET)      |
|                    |          |        |                   | 0. DIAM (INCHES)       | THICKNESS (INCHES) |
| CAISSON1           | CAISSON  | CAISL1 | .00               | .00 12.50 87.50        | 100.00             |
|                    |          | CAISUL | .00               | .00 12.50 87.50        | 112.50             |
| CAISSON2           | CAISSON  | CAISL2 | .00               | .00 100.00 87.50       | 12.50              |
|                    |          | CAISU2 | .00               | .00 100.00 87.50       | 112.50             |
| CAISSON3           | CAISSON  | CAISL3 | .00               | .00 187.50 87.50       | 12.50              |
|                    |          | CAISU3 | .00               | .00 187.50 87.50       | 112.50             |
| CAISSON4           | CAISSON  | CAISL4 | .00               | .00 187.50 -87.50      | 12.50              |
|                    |          | CAISU4 | .00               | .00 187.50 -87.50      | 112.50             |
| CAISSON5           | CAISSON  | CAISL5 | .00               | .00 100.00 -87.50      | 12.50              |
|                    |          | CAISU5 | .00               | .00 100.00 -87.50      | 112.50             |
| CAISSON6           | CAISSON  | CAISL6 | .00               | .00 12.50 -87.50       | 12.50              |
|                    |          | CAISU6 | .00               | .00 12.50 -87.50       | 112.50             |
| FOOTER1            | FOOTER   | FOOT1  | .00               | .00 .00 87.50          | 12.50              |
|                    |          | FOOT2  | .00               | .00 .00 87.50          | 12.50              |
| FOOTER2            | FOOTER   | FOOT3  | .00               | .00 200.00 -87.50      | 12.50              |
|                    |          | FOOT4  | .00               | .00 .00 -87.50         | 12.50              |
| LATERAC1           | LATERACE | BRACE6 | .00               | .00 12.50 -75.00       | 12.50              |
|                    |          | BPACE2 | .00               | .00 .00 75.00          | 12.50              |
| LATERAC2           | LATERACE | BRACE3 | .00               | .00 187.50 75.00       | 12.50              |
|                    |          | BRACES | .00               | .00 187.50 -75.00      | 12.50              |
| DIABRAC1           | DIABRACE | BRACE6 | .00               | .00 12.50 -75.00       | 12.50              |
|                    |          | BRACE1 | .00               | .00 12.50 .00          | 112.50             |
| DIABRAC2           | DIABRACE | BRACE1 | .00               | .00 12.50 .00          | 112.50             |
|                    |          | BRACE2 | .00               | .00 12.50 .00          | 12.50              |
| DIABRAC3           | DIABRACE | BRACE3 | .00               | .00 187.50 75.00       | 12.50              |
|                    |          | BRACE4 | .00               | .00 187.50 .00         | 112.50             |

| NAME     | CLASS    | JOINT  | OFFSET (FEET) | END COORDINATES (FEET) | LENGTH (FEET) | D. DIAM (INCHES) | WEIGHT (TRIPS) | BUYANCY FLD |
|----------|----------|--------|---------------|------------------------|---------------|------------------|----------------|-------------|
| CAISSON1 | CAISSON  | CAISL1 | .00           | .00 12.50 87.50        | 100.00        | 300.00           | 6.00           | 1084.20     |
|          |          | CAISUL | .00           | .00 12.50 87.50        | 112.50        |                  |                |             |
| CAISSON2 | CAISSON  | CAISL2 | .00           | .00 100.00 87.50       | 12.50         | 100.00           | 300.00         | 6.00        |
|          |          | CAISU2 | .00           | .00 100.00 87.50       | 112.50        |                  |                |             |
| CAISSON3 | CAISSON  | CAISL3 | .00           | .00 187.50 87.50       | 12.50         | 100.00           | 300.00         | 6.00        |
|          |          | CAISU3 | .00           | .00 187.50 87.50       | 112.50        |                  |                |             |
| CAISSON4 | CAISSON  | CAISL4 | .00           | .00 187.50 -87.50      | 12.50         | 100.00           | 300.00         | 6.00        |
|          |          | CAISU4 | .00           | .00 187.50 -87.50      | 112.50        |                  |                |             |
| CAISSON5 | CAISSON  | CAISL5 | .00           | .00 100.00 -87.50      | 12.50         | 100.00           | 300.00         | 6.00        |
|          |          | CAISU5 | .00           | .00 100.00 -87.50      | 112.50        |                  |                |             |
| CAISSON6 | CAISSON  | CAISL6 | .00           | .00 12.50 -87.50       | 12.50         | 100.00           | 300.00         | 6.00        |
|          |          | CAISU6 | .00           | .00 12.50 -87.50       | 112.50        |                  |                |             |
| FOOTER1  | FOOTER   | FOOT1  | .00           | .00 .00 87.50          | 12.50         | 200.00           | 300.00         | 6.00        |
|          |          | FOOT2  | .00           | .00 .00 87.50          | 12.50         |                  |                |             |
| FOOTER2  | FOOTER   | FOOT3  | .00           | .00 200.00 -87.50      | 12.50         | 200.00           | 300.00         | 6.00        |
|          |          | FOOT4  | .00           | .00 .00 -87.50         | 12.50         |                  |                |             |
| LATERAC1 | LATERACE | BRACE6 | .00           | .00 12.50 -75.00       | 12.50         | 150.00           | 120.00         | 3.00        |
|          |          | BPACE2 | .00           | .00 12.50 75.00        | 12.50         |                  |                |             |
| LATERAC2 | LATERACE | BRACE3 | .00           | .00 187.50 75.00       | 12.50         | 150.00           | 120.00         | 3.00        |
|          |          | BRACES | .00           | .00 187.50 -75.00      | 12.50         |                  |                |             |
| DIABRAC1 | DIABRACE | BRACE6 | .00           | .00 12.50 -75.00       | 12.50         | 125.00           | 120.00         | 3.00        |
|          |          | BRACE1 | .00           | .00 12.50 .00          | 112.50        |                  |                |             |
| DIABRAC2 | DIABRACE | BRACE1 | .00           | .00 12.50 .00          | 112.50        | 125.00           | 120.00         | 3.00        |
|          |          | BRACE2 | .00           | .00 12.50 .00          | 12.50         |                  |                |             |
| DIABRAC3 | DIABRACE | BRACE3 | .00           | .00 187.50 75.00       | 12.50         | 150.00           | 120.00         | 3.00        |
|          |          | BRACE4 | .00           | .00 187.50 .00         | 112.50        |                  |                |             |

ESCAR \*\*\*

DATE 85/12/09 \*\*\*

## SEMISUBMERSIBLE MOORING

## JACKET MEMBER SUMMARY

## MEMBER MEMBER EXTREMITIES MEMBER PROPERTIES

| NAME     | CLASS    | JOINT  | OFFSET (FEET) | END COORDINATES (FEET) | LENGTH (FEET) | DIA M  | THICKNESS (INCHES) | WEIGHT (KIPS) | BUDGANCY FILE (KIPS) |
|----------|----------|--------|---------------|------------------------|---------------|--------|--------------------|---------------|----------------------|
| DIAGR/C4 | DIAGRACE | BRACE4 | .00           | .00                    | 187.50        | *00    | 112.50             | 125.00        | 120.00               |
|          | BRACES   |        | .00           | .00                    | 187.50        | -75.00 | 12.50              |               |                      |

| DIAGR/C4 | DIAGRACE | BRACE4 | .00 | .00 | 187.50 | *00 | 112.50 | 125.00 | 120.00 | 3.00 | 468.65 | 628.32 |
|----------|----------|--------|-----|-----|--------|-----|--------|--------|--------|------|--------|--------|
|          | BRACES   |        |     |     |        |     |        |        |        |      |        |        |

SENISUMMERSIDE MORNING

卷之三

DATE 05/12/09

DATE 05/12/09

JACKET CLASS SUMMARY

| CLASS<br>NAME | CLASS<br>WEIGHT<br>(KIPS) | CENTER OF GRAVITY |            | CENTER OF BUOYANCY (FEET) |                 | CLASS<br>BUOYANCY<br>(KIPPS) | CENTER OF BUOYANCY (FEET) |              |
|---------------|---------------------------|-------------------|------------|---------------------------|-----------------|------------------------------|---------------------------|--------------|
|               |                           | X---              | Y---       | Z---                      | X---            |                              | Y---                      | Z---         |
| CAISSON       | 11305.21                  | 100.00            | .00        | 62.50                     | 18849.56        | 100.00                       | .00                       | 62.50        |
| FUDGER        | 7536.81                   | 100.00            | .00        | 12.50                     | 12566.37        | 100.00                       | .00                       | 12.50        |
| LATBRACE      | 1124.75                   | 100.00            | .00        | 12.50                     | 1507.96         | 100.00                       | .00                       | 12.50        |
| DIABRACE      | 1874.59                   | 100.00            | .00        | 62.50                     | 2513.27         | 100.00                       | .00                       | 62.50        |
| PLATE         | 5108.16                   | 100.00            | .00        | 112.50                    | 667.73          | 100.00                       | .00                       | 112.50       |
| <b>TOTAL</b>  | <b>26949.52</b>           | <b>100.00</b>     | <b>.00</b> | <b>75.91</b>              | <b>36104.90</b> | <b>100.00</b>                | <b>.00</b>                | <b>75.91</b> |

RESERVE DIVINITY • 276 PRESENT

\*\*\*\*\* OSCAP \*\*\*

DATE 05/12/09

SEMI-SUBMERSIBLE MOORING

PROPERTIES OF JACKET IN JACKET INPUT SYSTEM

MODEL HAS 14 MEMBERS AND 1 PLATES

## JACKET WEIGHT

INPUT= .000 KIPS CALCULATED = 26949.516 KIPS

## JACKET BUOYANCY

INPUT= .000 KIPS CALCULATED = 36104.894 KIPS

## JACKET CENTER OF GRAVITY ( FEET )

## CALCULATED

|     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|
| X=  | .00 | Y=  | .00 | Z=  | .00 |
| RX= | .00 | FY= | .00 | RZ= | .00 |
| RY= | .00 | FZ= | .00 |     |     |

## SUBMERGED CENTER OF BUOYANCY

X = 100.00 FEET Y = .00 FEET Z = 43.93 FEET

## JACKET RADIUS OF GYRATION

RX = .00 FEET FY = .00 FEET RZ = .00 FEET

## NAMES OF JOINTS ON LAUNCH LEGS

STARBOARD

LEADING COORD LEADING COORD

PORT

LEADING COORD3 TRAILING COORD4

INITIAL LOCATION OF JACKET ON BARGE

----- Y -----

----- X -----

----- Z -----

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## **SEISMIC SUBSIDENCE MODELLING**

JACKET DATA

DATE 85/12/09

DATE 05/12/00

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LAW AND POLICIES IN VESSEL COORDINATE SYSTEM

| JOINT  | NAME   | X       | Y      |
|--------|--------|---------|--------|
| JOINT  | NAME   | X       | Y      |
| DECK2  | 200.00 | 100.00  | 112.50 |
| DECK4  | 200.00 | -100.00 | 112.50 |
| COORD2 | 200.00 | 100.00  | .00    |
| COORD4 | .00    | -100.00 | .00    |
| COORD1 | .00    | .00     | .00    |
| COORD3 | .00    | .00     | .00    |
| DECK1  | .00    | .00     | .00    |

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ADDED MASS COEFFICIENT FOR TUBULARS      =      1.000

DRAG COEFFICIENTS FOR TURBULARS

| REYNOLDS<br>NUMBER | DRAg<br>COEFFICIENT |
|--------------------|---------------------|
| .10000E+04         | 1.2000              |
| .20000E+06         | 1.2000              |
| .30000E+06         | 1.0000              |
| .40000E+06         | •3200               |
| .50000E+06         | •2700               |
| .90000E+06         | •4000               |
| .20000E+07         | .5700               |
| .50000E+07         | .6200               |
| .10000E+09         | .6200               |

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SEMI SUBMERSIBLE MOORING

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CSCAR CSCAR CSCAR CSCAR CSCAR

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DATE 85/12/09

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USCAR OPTIIONS SUMMARY

UNITS FOR LENGTH ARE FEET UNITS FOR FORCE ARE KIPS

SPECIFIC WEIGHT OF WATER = 64.00000

SYSTEM IS COMPOSED OF 1 BODIES

| BODY NAME | BODY TYPE | DIFFRACTION TYPE |
|-----------|-----------|------------------|
| JACKY     | SEMI      | STRIP            |

MOORING MODULE WILL BE ENTERED

1 CURVE OF FORM CASES WILL BE CONSIDERED

INTEGRATION WILL BE PERFORMED USING TRAPAZOID RULE

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\*\*\* CSCAP \*\*\*\* SEMIUMATIC MUDRING  
\* -----

DATE 85/12/09

## ENVIRONMENTAL CONDITIONS

WAVES

| SPECTRUM TYPE | SIGNIFICANT HEIGHT<br>FEET | MEAN PERIOD<br>(SEC.) | DIRECTION<br>(DEG.) |
|---------------|----------------------------|-----------------------|---------------------|
|               | .0                         | .00                   | .00                 |

WIND

| SPEED<br>(KNOTS) | DIRECTION<br>(DEG.) |
|------------------|---------------------|
| 0                | 0                   |

CURRENT

DIRECTION = 0. DEG.

| SPEED<br>( FEET / SEC ) | DEPTH<br>FEET |
|-------------------------|---------------|
| -                       | -             |

ENTERING HYDROSTATICS MODULE

LEVEL 5 MOD026.6 OCTOBER 1985 SEP100

\*\*\*\*\* OSCAR \*\*\*\*\*

SEMI-SUBMERSIBLE MOORING

DATE 05/12/09

## HYDROSTATIC PROPERTIES

LOCATIONS ARE WITH RESPECT TO X = .0 Y = .0 Z = .0

CONDITION DISPLAC. CENTER OF BUOYANCY( FEET ) V.P. AREA C. FLOTATION( FEET ) METACENTRIC HEIGHT( FEET )

| DRAFT | TRIM | ROLL     | KIPS   | DEG | DEG   | FEET  | FEET   | FEET | FEET  | FEET  | FEET  |
|-------|------|----------|--------|-----|-------|-------|--------|------|-------|-------|-------|
| 75.00 | .00  | 27426.10 | 100.00 | .00 | 27.71 | 3338. | 100.00 | .00  | 81.34 | 70.00 | 53.62 |

\*\*\*\*\* OSCAR \*\*\*\*\*

\*\*\*\*\* SEMI-SUBMERSIBLE MUDPIG

DATE 05/12/09

## HYDROSTATIC PROPERTIES

LOCATIONS ARE WITH RESPECT TO X = .0 Y = .0 Z = .0

| CONDITION    | DISPLACEMENT  |             | LOAD TO CHANGE<br>SURFACE |          | MOMENT TO TRIM  |                      |
|--------------|---------------|-------------|---------------------------|----------|-----------------|----------------------|
|              | DRAFT<br>FEET | ROLL<br>DEG | ( KIPS )                  | ( FEET ) | ( KIPS / INCH ) | ( FEET ) / .01 DEG ) |
| 75.0 .00 .00 | 27426.10      | 0 .0        | 17.00                     | 202.82   |                 |                      |

PAGE 15

CSCAR \*

SEMISUMMERSIBLE MOORING

DATE 05/12/09

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NOTES DEFINED FOR EQUINE

| BODY NAME | BODY TYPE | DRAFT | TRIM. | LENGTH | BEAM  |
|-----------|-----------|-------|-------|--------|-------|
| JACKY     | SEMI      | 75.0  | .00   | 200.00 | 200.0 |

MASS PROPERTIES OF BODIES

**BODY NAME      VCG      CM      CM      RADII OF CYRATION**

HACKY 30,00 31,34 75,0 75,0 75,0

ОСКАР

DATE 85/12/89

## **SEMISUBMERSIBLE HOOFING**

MOORING LINE TYPE SUMMARY

\*\*\* OSCAR \*\*\*

DATE 85/12/09

## SEASUBMERSIBLE MOORING

BODIES DEFINED FOR MOORING

| BODY NAME | BODY TYPE | DRAFT | TRIM | LENGTH | BEAM  |
|-----------|-----------|-------|------|--------|-------|
| JACKY     | SEMI      | 75.0  | .00  | 200.00 | 200.0 |

MASS PROPERTIES OF BODIES

| BODY NAME | VCG   | GFM   | RADIUS OF GYRATION |       |      |
|-----------|-------|-------|--------------------|-------|------|
|           |       |       | ROLL               | PITCH | YAW  |
| JACKY     | 50.00 | 31.34 | 75.0               | 75.0  | 75.0 |

\*\*\* CSCAR \*\*\*

DATE 85/12/09

## SEMI-SUBMERSIBLE MOOKING

## H O O R I N G L I N E T Y P E S U M M A R Y

| NAME     | TYPE | WATER DEPTH | SLOPE OF BOTTOM | SEGMENT 1 |       |        | SEGMENT 2 |      |        | SEGMENT 3 |      |        |
|----------|------|-------------|-----------------|-----------|-------|--------|-----------|------|--------|-----------|------|--------|
|          |      |             |                 | K1        | K2    | LENGTH | W/L       | A.E. | LENGTH | W/L       | A.E. | LENGTH |
| CHAIN    | 350. | .0000       | .000E+00        | .000E+00  | 1349. | 78.0   | .77E+00   | 0.   | 0.     | .00E+00   | 0.   | 0.     |
| WIRE     | 350. | .0000       | .000E+00        | .000E+00  | 4270. | 14.5   | .50E+00   | 0.   | 0.     | .00E+00   | 0.   | 0.     |
| WIRECHAI | 350. | .0000       | .000E+00        | .000E+00  | 4790. | 14.5   | .50E+00   | 0.   | 540.   | .77E+00   | 0.   | 0.     |

LEVEL 5 M0026.6 OCTOBER 1985 SER100

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\*\*\* OSCAR \*\*\*

DATE 85/12/05

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**A D D E T I N F R Y A C C E F F I C I C T Y S**  
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BODY NAME = JACKY      BODY TYPE = SEMI

DRAFT = 75.00 FEET      TRIM ANGLE = .00 DEG.

| ENCOUNTER<br>FREQUENCY<br>PAD/SEC. | ADDED MASS COEFFICIENTS |        |         | ADDED RADII OF GYRATION ( FEET ) |         |          |
|------------------------------------|-------------------------|--------|---------|----------------------------------|---------|----------|
|                                    | -SURGE-                 | -SWAY- | -HEAVE- | -ROLL-                           | -PITCH- | --YAW--  |
| 251                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 314                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 331                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 349                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 370                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 393                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 419                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 433                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 449                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 465                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 483                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 503                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 524                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 546                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 571                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 598                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 628                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 661                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 698                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 739                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 785                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 838                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 898                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 967                                | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 1047                               | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 1142                               | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 1257                               | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 1396                               | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 1571                               | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |
| 2064                               | .5425                   | .9255  | .5344   | 76.4435                          | 68.8526 | 129.4762 |

\*\*\* OSCAR \*\*\*

SEMISUBMERSIBLE HOOPING

DATE 85/12/09

## DAMPING COEFFICIENTS / VESSEL MASS

DRAFT = 75.00 FEET

BODY NAME = JACKY

BODY TYPE = SEMI

TRIM ANGLE = .00 DEG.

B - 21

| ENCOUNTER<br>FREQUENCY<br>RAD/SEC. | --SURGE-- | --SWAY-- | --HEAVE-- | --ROLL-- | --PITCH-- | --YAW-- |
|------------------------------------|-----------|----------|-----------|----------|-----------|---------|
| .251                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .314                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .331                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .349                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .370                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .393                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .419                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .433                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .449                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .465                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .483                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .503                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .524                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .546                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .571                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .598                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .628                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .661                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .698                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .739                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .765                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .838                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .898                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| .967                               | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| 1.047                              | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| 1.142                              | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| 1.257                              | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| 1.396                              | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| 1.571                              | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |
| 2.094                              | .0000     | .0000    | .0000     | .0000    | .0000     | .0000   |

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444 CSCAP 444

SEMISUBMERSIBLE MOORING

DATE 85/12/09

4

## EXCITING FORCES ON VESSEL

BODY NAME = JACKV HEADING = .0 DEG.

ENCOUNTER FORCE (MOMENT) / WAVE AMPLITUDE / VESSEL MASS

FREQUENCY PERIOD - SURGE - SWAY - HEAVE - ROLL - PITCH - YAW -  
-(RAD/SEC) - (SEC) - AMPL. PHASE AMPL. PHASE AMPL. PHASE AMPL. PHASE

|   |        |       |       |        |       |       |       |        |       |        |         |        |       |       |
|---|--------|-------|-------|--------|-------|-------|-------|--------|-------|--------|---------|--------|-------|-------|
| A | .2513  | 25.00 | .0806 | -78.4  | .0000 | -90.0 | .1556 | 11.6   | .0000 | -90.0  | 16.3013 | -151.1 | .0000 | -90.0 |
|   | .3142  | 20.00 | .1307 | -72.4  | .0000 | -90.0 | .1119 | 17.6   | .0000 | 90.0   | 13.0626 | -131.3 | .0000 | -90.0 |
|   | .3307  | 19.00 | .1420 | -70.5  | .0000 | .0    | .100  | 19.5   | .0000 | -90.0  | 12.2565 | -125.2 | .0000 | -90.0 |
|   | .3491  | 18.00 | .1547 | -68.3  | .0000 | -90.0 | .0664 | 21.7   | .0000 | 90.0   | 11.4867 | -117.1 | .0000 | -90.0 |
|   | .3696  | 17.00 | .1686 | -65.7  | .0000 | -90.0 | .0711 | 24.3   | .0004 | 114.3  | 10.7616 | -107.0 | .0000 | -90.0 |
|   | .3927  | 16.00 | .1636 | -62.6  | .0000 | -90.0 | .0541 | 27.4   | .1126 | 117.4  | 10.0714 | -95.1  | .0000 | 90.0  |
|   | .4189  | 15.00 | .202  | -58.8  | .0000 | -90.0 | .0349 | 31.2   | .1270 | 121.2  | 9.7405  | -79.8  | .0000 | -90.0 |
|   | .4333  | 14.50 | .2086 | -56.6  | .0000 | .0    | .0247 | 33.4   | .1351 | 123.4  | 9.6171  | -71.4  | .0000 | 90.0  |
|   | .4488  | 14.00 | .2171 | -54.2  | .0000 | -90.0 | .0139 | 35.8   | .1440 | 125.8  | 9.5677  | -62.5  | .0000 | -90.0 |
|   | .4654  | 13.00 | .2253 | -51.5  | .0000 | -90.0 | .0030 | 38.5   | .1536 | 128.5  | 9.5373  | -53.2  | .0000 | -90.0 |
|   | .4833  | 13.00 | .2332 | -48.4  | .0000 | -90.0 | .0085 | 138.4  | .1640 | 131.6  | 9.6274  | -43.4  | .0000 | 90.0  |
|   | .5027  | 12.50 | .2405 | -45.0  | .0000 | 90.0  | .0201 | 135.0  | .1754 | 135.0  | 9.7739  | -33.1  | .0000 | -90.0 |
|   | .5236  | 12.00 | .2466 | -41.2  | .0000 | -90.0 | .0319 | 131.2  | .2501 | 138.8  | 9.9579  | -22.6  | .0000 | -90.0 |
|   | .5464  | 11.50 | .2510 | -36.9  | .0000 | 90.0  | .0433 | 126.9  | .2674 | 143.1  | 10.1281 | -11.6  | .0000 | -90.0 |
|   | .5712  | 11.00 | .2532 | -31.9  | .0000 | -90.0 | .0543 | 121.9  | .2858 | 148.1  | 10.3150 | -.2    | .0000 | 90.0  |
|   | .5984  | 10.50 | .2513 | -26.3  | .0000 | .0    | .0640 | 116.3  | .3049 | 153.7  | 10.3076 | 12.1   | .0000 | -90.0 |
|   | .6283  | 10.00 | .2442 | -19.8  | .0000 | 90.0  | .0720 | 109.8  | .3645 | 160.2  | 10.1018 | 25.7   | .0000 | -90.0 |
|   | .6614  | 9.50  | .2299 | -12.2  | .0000 | -90.0 | .0773 | 102.2  | .3850 | 167.8  | 9.6142  | 41.3   | .0000 | 90.0  |
|   | .6981  | 9.00  | .2061 | -3.3   | .0000 | -90.0 | .0769 | 93.3   | .4024 | 176.7  | 8.8179  | 60.2   | .0000 | -90.0 |
|   | .7392  | 8.50  | .1697 | 7.2    | .0000 | -90.0 | .0754 | 82.8   | .4410 | -172.8 | 7.7104  | 45.3   | .0000 | -90.0 |
|   | .7854  | 8.00  | .1716 | 19.8   | .0000 | -90.0 | .0657 | 70.2   | .4402 | -160.2 | 6.7062  | 121.1  | .0000 | 90.0  |
|   | .8378  | 7.50  | .0483 | 34.9   | .0000 | -90.0 | .0490 | -55.1  | .4178 | -145.1 | 6.8349  | 169.0  | .0000 | -90.0 |
|   | .8676  | 7.00  | .0371 | -126.6 | .0000 | -90.0 | .0256 | -36.6  | .3506 | -126.6 | 6.8605  | -143.4 | .0000 | -90.0 |
|   | .9666  | 6.50  | .1280 | -103.7 | .0000 | -90.0 | .0019 | 166.3  | .2508 | -103.7 | 11.8117 | -102.8 | .0000 | -90.0 |
|   | 1.0472 | 6.00  | .1159 | -74.9  | .0000 | -90.0 | .0265 | -164.9 | .0712 | -74.9  | 13.5170 | -63.5  | .0000 | -90.0 |
|   | 1.1424 | 5.50  | .1631 | -37.8  | .0000 | 90.0  | .0377 | -127.8 | .1743 | 142.2  | 10.7221 | -17.2  | .0000 | 90.0  |
|   | 1.2566 | 5.00  | .0667 | 11.0   | .0000 | -90.0 | .0259 | -79.0  | .4039 | -169.0 | 3.0380  | 132.6  | .0000 | -90.0 |
|   | 1.3963 | 4.50  | .3296 | -103.1 | .0000 | -90.0 | .0020 | 166.9  | .3689 | -103.1 | 21.2314 | -102.6 | .0000 | -90.0 |
|   | 1.5708 | 4.00  | .4538 | -11.0  | .0000 | 90.0  | .0106 | -101.0 | .1012 | 169.0  | 27.4223 | -8.9   | .0000 | 90.0  |
|   | 2.0944 | 3.00  | .3829 | -29.5  | .0000 | -90.0 | .0111 | 60.5   | .2666 | -29.5  | 25.0938 | -32.0  | .0000 | -90.0 |

\*\*\*\*\* CSCAR \*\*\*\*\*  
 \* SEMISUBMERSIBLE MOORING  
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DATE 85/12/09

## EXCITING FORCES ON VESSEL

BODY NAME = JACKY HEADING = 22.5 DEG.

## ENCOUNTER FORCE (MOMENT) / WAVE AMPLITUDE / VESSEL PASS

| FREQUENCY<br>-(RAD/SEC)- | PERIOD<br>-(SEC)- | SURGE  |        |       | SWAY   |       |        | HEAVE  |        |         | ROLL   |         |        | PITCH |       |       | YAW   |  |  |
|--------------------------|-------------------|--------|--------|-------|--------|-------|--------|--------|--------|---------|--------|---------|--------|-------|-------|-------|-------|--|--|
|                          |                   | AMPL.  | PHASE  | AMPL. | AMPL.  | PHASE | AMPL.  | AMPL.  | PHASE  | AMPL.   | PHASE  | AMPL.   | PHASE  | AMPL. | PHASE | AMPL. | PHASE |  |  |
| 2513                     | 25.00             | .0818  | -79.3  | .0420 | -79.3  | .1356 | 10.7   | 2.0343 | 100.7  | 16.1914 | -153.2 | 4.2035  | -80.7  |       |       |       |       |  |  |
| 3142                     | 20.00             | .1206  | -73.7  | .0618 | -73.7  | .1119 | 16.3   | 2.7079 | 106.3  | 12.8030 | -134.7 | 6.1874  | -76.0  |       |       |       |       |  |  |
| 3307                     | 19.00             | .0310  | -72.0  | .0671 | -72.0  | .1000 | 16.0   | 2.8561 | 108.0  | 11.9478 | -128.8 | 6.7145  | -74.1  |       |       |       |       |  |  |
| 3491                     | 18.00             | .0426  | -69.9  | .0730 | -69.9  | .0865 | 20.1   | 2.9995 | 110.1  | 11.1104 | -121.0 | 7.3041  | -72.3  |       |       |       |       |  |  |
| 3606                     | 17.00             | .0554  | -67.5  | .0794 | -67.5  | .0711 | 22.5   | 3.2254 | 112.5  | 10.3164 | -111.1 | 7.9525  | -70.2  |       |       |       |       |  |  |
| 3927                     | 16.00             | .0691  | -64.6  | .0864 | -64.6  | .0542 | 25.4   | 3.3403 | 115.4  | 9.5456  | -99.2  | 8.6491  | -67.4  |       |       |       |       |  |  |
| 4189                     | 15.00             | .0843  | -61.2  | .0940 | -61.2  | .0351 | 28.8   | 3.4701 | 118.8  | 9.1115  | -83.8  | 9.4129  | -64.3  |       |       |       |       |  |  |
| 4333                     | 14.50             | .01919 | -59.1  | .0978 | -59.1  | .0249 | 30.9   | 3.4833 | 120.9  | 8.9473  | -75.3  | 9.7998  | -62.4  |       |       |       |       |  |  |
| 4448                     | 14.00             | .0195  | -56.9  | .1017 | -56.9  | .0143 | 33.1   | 3.4723 | 123.1  | 8.8643  | -66.2  | 10.1873 | -60.4  |       |       |       |       |  |  |
| 4654                     | 13.50             | .0207  | -54.4  | .1054 | -54.4  | .0034 | 35.6   | 3.4300 | 125.6  | 8.8149  | -56.6  | 10.5600 | -58.0  |       |       |       |       |  |  |
| 4633                     | 13.00             | .02141 | -51.6  | .1090 | -51.6  | .0078 | -141.6 | 3.3502 | 128.4  | 8.8935  | -46.5  | 10.9214 | -55.4  |       |       |       |       |  |  |
| 5027                     | 12.50             | .0205  | -48.5  | .1122 | -48.5  | .0193 | -138.5 | 3.2228 | 131.5  | 9.0418  | -36.2  | 11.2502 | -52.4  |       |       |       |       |  |  |
| 5236                     | 12.00             | .02260 | -44.9  | .1150 | -44.9  | .0309 | -134.9 | 3.1003 | 135.0  | 9.2661  | -25.5  | 11.7220 | -49.0  |       |       |       |       |  |  |
| 5464                     | 11.50             | .02297 | -40.9  | .1169 | -40.9  | .0420 | -130.9 | 2.8463 | 139.1  | 9.4681  | -14.6  | 11.7220 | -49.2  |       |       |       |       |  |  |
| 5712                     | 11.00             | .02315 | -36.4  | .1170 | -36.4  | .0526 | -126.4 | 2.5408 | 143.6  | 9.6941  | -3.5   | 11.8134 | -40.6  |       |       |       |       |  |  |
| 5984                     | 10.50             | .02295 | -31.1  | .1170 | -31.1  | .0619 | -121.1 | 2.1111 | 148.9  | 9.7455  | 8.3    | 11.7275 | -35.3  |       |       |       |       |  |  |
| 6283                     | 10.00             | .02230 | -25.1  | .1139 | -25.1  | .0695 | -115.1 | 1.6133 | 154.9  | 9.6332  | 21.0   | 11.4135 | -28.8  |       |       |       |       |  |  |
| 6614                     | 9.50              | .02103 | -18.1  | .1070 | -18.1  | .0742 | -108.1 | .9621  | 161.9  | 9.2350  | 35.3   | 10.7943 | -20.7  |       |       |       |       |  |  |
| 6681                     | 9.00              | .01896 | -9.9   | .0980 | -9.9   | .0753 | -99.9  | .2117  | 170.1  | 8.5278  | 52.1   | 9.7971  | -10.3  |       |       |       |       |  |  |
| 7392                     | 8.50              | .01588 | -2     | .0832 | -2     | .0717 | -90.2  | .6112  | -2     | 7.4690  | 73.5   | 8.3492  | 4.4    |       |       |       |       |  |  |
| 7854                     | 8.00              | .01164 | 11.4   | .0630 | 11.4   | .0622 | -78.6  | 1.4945 | 11.4   | 6.2262  | 103.0  | 6.5598  | 27.7   |       |       |       |       |  |  |
| 8378                     | 7.50              | .00626 | 25.4   | .0372 | 25.4   | .0467 | -64.6  | 2.2696 | 25.4   | 5.3940  | 145.3  | 5.2010  | 69.7   |       |       |       |       |  |  |
| 8876                     | 7.00              | .00121 | 42.4   | .0077 | 42.4   | .0261 | -47.6  | 2.7884 | 42.4   | 5.7661  | -164.5 | 6.2120  | 125.4  |       |       |       |       |  |  |
| 9666                     | 6.50              | .00566 | -116.4 | .0207 | -116.4 | .0037 | -26.4  | 2.7866 | 63.6   | 6.8896  | -119.5 | 9.5440  | 166.1  |       |       |       |       |  |  |
| 1.0472                   | 6.00              | .00895 | -89.7  | .0384 | -89.7  | .0145 | -179.7 | 2.0120 | 90.3   | 7.0795  | -77.9  | 12.8065 | -162.3 |       |       |       |       |  |  |
| 1.1424                   | 5.50              | .00739 | -55.5  | .0345 | -55.5  | .0211 | -145.5 | .4972  | 124.5  | 4.8658  | -29.7  | 12.7874 | -129.8 |       |       |       |       |  |  |
| 1.2566                   | 5.00              | .00241 | -10.4  | .0134 | -10.4  | .0132 | -100.4 | .9725  | -10.4  | 1.416   | 58.1   | 5.1216  | -85.2  |       |       |       |       |  |  |
| 1.3963                   | 4.50              | .00710 | 50.5   | .0275 | 50.5   | .0034 | 140.5  | .6204  | -129.5 | 3.1401  | 44.4   | 12.0001 | 127.2  |       |       |       |       |  |  |
| 1.5708                   | 4.00              | .03052 | 135.6  | .0169 | 135.6  | .0172 | -136.4 | 7.1259 | -44.4  | 18.7240 | 130.3  | 23.0168 | -164.9 |       |       |       |       |  |  |
| 2.0944                   | 3.00              | .00190 | 91.1   | .0077 | 91.1   | .0188 | -178.9 | .5981  | -88.9  | 2.2098  | 32.6   | 11.4618 | 4.5    |       |       |       |       |  |  |

## SEMISSUBMERSIBLE MOORING

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EXCITING FORCES ON VESSEL  
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BODY NAME = JACKV HEADING = 45.0 DEG.

ENCOUNTER FORCE (NOMENT) / WAVE AMPLITUDE / VESSEL MASS  
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FREQUENCY PERIOD SURGE SWAY HEAVE ROLL PITCH YAW  
-(RAD/SEC)- -(SEC)- AMPL. PHASE AMPL. PHASE AMPL. PHASE AMPL. PHASE

|    |        |       |       |        |       |        |        |        |        |        |         |        |         |        |
|----|--------|-------|-------|--------|-------|--------|--------|--------|--------|--------|---------|--------|---------|--------|
| A  | 2513   | 25.00 | .0625 | -81.8  | .0775 | -81.8  | .1555  | 8.2    | 3.7963 | 98.2   | 15.9260 | -159.4 | 7.7487  | -82.5  |
| B  | 3142   | 26.00 | .0620 | -77.5  | .1136 | -77.5  | .1120  | 12.5   | 5.0037 | 102.5  | 12.1596 | -144.6 | 11.3702 | -79.3  |
| C  | 3307   | 19.00 | .0599 | -76.2  | .1232 | -76.2  | .1001  | 13.8   | 5.2767 | 103.8  | 11.1767 | -139.8 | 12.3305 | -77.5  |
| D  | 3491   | 18.00 | .1086 | -74.7  | .1339 | -74.7  | .0866  | 15.3   | 5.5409 | 105.3  | 10.1590 | -133.2 | 13.3940 | -76.6  |
| E  | 3696   | 17.00 | .1181 | -72.8  | .1454 | -72.8  | .0713  | 17.2   | 5.8570 | 107.2  | 9.1464  | -124.1 | 14.5546 | -75.0  |
| F  | 3927   | 16.00 | .1284 | -70.6  | .1576 | -70.6  | .0546  | 19.4   | 6.0541 | 109.4  | 8.1185  | -112.9 | 15.7968 | -73.0  |
| G  | 4189   | 15.00 | .1396 | -67.9  | .1711 | -67.9  | .0359  | 22.1   | 6.2737 | 112.1  | 7.3500  | -97.2  | 17.1321 | -70.7  |
| H  | 4333   | 14.50 | .1451 | -66.4  | .1777 | -66.4  | .0260  | 23.6   | 6.2964 | 113.6  | 7.0442  | -88.0  | 17.7984 | -69.4  |
| I  | 4488   | 14.00 | .1506 | -64.7  | .1842 | -64.7  | .0157  | 25.3   | 6.2523 | 115.3  | 6.8399  | -77.9  | 18.4561 | -68.6  |
| J  | 4654   | 13.50 | .1559 | -62.7  | .1904 | -62.7  | .0052  | 27.3   | 6.1559 | 117.3  | 6.7153  | -67.2  | 19.0801 | -66.3  |
| K  | 4833   | 13.00 | .1609 | -60.6  | .1962 | -60.6  | .0056  | 150.6  | 5.9886 | 119.4  | 6.7472  | -55.9  | 19.6648 | -64.6  |
| L  | 5027   | 12.50 | .1652 | -58.2  | .2011 | -58.2  | .0163  | 148.2  | 5.7295 | 121.0  | 6.8920  | -44.5  | 20.1730 | -62.6  |
| M  | 5236   | 12.00 | .1686 | -55.5  | .2049 | -55.5  | .0272  | 145.5  | 5.4112 | 124.5  | 7.1734  | -33.2  | 20.5662 | -60.5  |
| N  | 5464   | 11.50 | .1706 | -52.4  | .2069 | -52.4  | .0373  | 142.4  | 4.9056 | 127.6  | 7.4463  | -22.6  | 20.7903 | -58.1  |
| O  | 5712   | 11.00 | .1708 | -48.9  | .2067 | -48.9  | .0466  | 138.9  | 4.2849 | 131.1  | 7.7423  | -11.9  | 20.8036 | -55.5  |
| P  | 5984   | 10.50 | .1681 | -44.9  | .2029 | -44.6  | .0543  | 134.9  | 3.4297 | 135.1  | 7.8932  | -1.5   | 20.4771 | -52.7  |
| Q  | 6283   | 10.00 | .1618 | -40.3  | .1947 | -40.3  | .0600  | 130.3  | 2.3963 | 139.7  | 7.8984  | 9.2    | 19.7306 | -49.7  |
| R  | 6614   | 9.50  | .1506 | -35.0  | .1807 | -35.0  | .0625  | 125.6  | 1.0983 | 145.0  | 7.5947  | 20.4   | 18.4500 | -46.6  |
| S  | 6981   | 9.00  | .1335 | -28.7  | .1598 | -28.7  | .0610  | 118.7  | .4014  | -28.7  | 6.9476  | 32.8   | 16.5513 | -43.8  |
| T  | 7392   | 8.50  | .1492 | -21.2  | .1304 | -21.2  | .0549  | 111.2  | 2.0682 | -21.2  | 5.8833  | 47.6   | 13.9705 | -42.3  |
| U  | 7854   | 8.00  | .0777 | -12.4  | .0926 | -12.4  | .0431  | -102.4 | 3.7905 | -12.4  | 4.3804  | 67.0   | 10.020  | -44.2  |
| V  | 8378   | 7.50  | .0406 | -1.7   | .0263 | -91.7  | .52999 | -1.7   | 2.6681 | 98.0   | 8.1126  | -55.1  | 8.1126  | -55.1  |
| W  | 8976   | 7.00  | .0034 | 11.4   | .0041 | 11.4   | .0067  | -78.6  | 6.1578 | 11.4   | 1.4741  | 164.4  | 7.1423  | -75.4  |
| X  | 9666   | 6.50  | .0219 | -152.4 | .0271 | -152.4 | .0111  | 17.6   | 5.7318 | 27.6   | 1.6658  | -110.8 | 7.8415  | -82.7  |
| Y  | 1.0472 | 6.00  | .0168 | -132.0 | .0254 | -132.0 | .0201  | 138.0  | 3.3423 | 48.0   | 2.0552  | -30.4  | 7.1920  | -62.7  |
| Z  | 1.1424 | 5.50  | .0317 | 74.2   | .0228 | 74.2   | .0153  | 164.2  | 1.0629 | -105.8 | 4.1379  | 52.5   | 5.1217  | 10.6   |
| AA | 1.2566 | 5.00  | .0926 | 108.7  | .0842 | 108.7  | .0002  | 18.7   | 5.2055 | -71.3  | 7.0283  | 106.8  | 8.4257  | 106.2  |
| AB | 1.3963 | 4.50  | .0596 | 155.3  | .0516 | 155.3  | .0149  | 65.3   | 3.5006 | -24.7  | 4.5475  | 174.4  | 7.4610  | -158.3 |
| AC | 1.5708 | 4.00  | .0025 | -139.6 | .0029 | -139.6 | .0163  | 130.4  | 1.1610 | 40.4   | 2.0785  | -21.3  | 8.8376  | -51.4  |
| AD | 2.0944 | 3.00  | .0225 | 101.9  | .0203 | 101.9  | 11.9   | 1.7589 | -78.1  | 3.4115 | 138.5   | 9.3393 | 24.5    |        |

\*\*\*\*\* OSCAR \*\*\*\*\*

DATE 05/12/09

## SEABOTTOMABLE MOORING

## EXCITING FORCES ON VESSEL

BODY NAME = JACKY HEADING = 67.5 DEG.

## ENCOUNTER FORCE (MOMENT) / WAVE AMPLITUDE / VESSEL PARS

| FREQUENCY<br>-(RAD/SEC)- | PERIOD<br>--(SEC)-- | SURGE   |        |        | SWAY   |         |        | HEAVE   |       |         | ROLL   |         |        | PITCH |       |       | YAW   |  |  |
|--------------------------|---------------------|---------|--------|--------|--------|---------|--------|---------|-------|---------|--------|---------|--------|-------|-------|-------|-------|--|--|
|                          |                     | AMPL.   | PHASE  | AMPL.  | PHASE  | AMPL.   | PHASE  | AMPL.   | PHASE | AMPL.   | PHASE  | AMPL.   | PHASE  | AMPL. | PHASE | AMPL. | PHASE |  |  |
| 0.2513                   | 25.00               | -0.338  | -85.5  | -10.0  | -85.5  | -1554   | 4.5    | 4.9605  | 94.5  | 15.6537 | -168.0 | 10.0999 | -86.2  |       |       |       |       |  |  |
| .3142                    | 30.00               | -0.496  | -83.3  | -14.7  | -83.3  | -1120   | 6.7    | 6.5373  | 96.7  | 11.4901 | -160.4 | 14.7720 | -84.3  |       |       |       |       |  |  |
| .3307                    | 19.00               | -0.538  | -82.5  | -160.1 | -92.5  | -1001   | 7.5    | 6.8925  | 97.5  | 10.3630 | -157.5 | 16.0076 | -83.5  |       |       |       |       |  |  |
| .3491                    | 18.00               | -0.585  | -81.7  | -1736  | -81.7  | -0867   | 8.3    | 7.2364  | 98.3  | 9.1323  | -153.5 | 17.3608 | -82.8  |       |       |       |       |  |  |
| .3696                    | 17.00               | -0.635  | -80.7  | -1882  | -80.7  | -0717   | 9.3    | 7.5940  | 99.3  | 7.8206  | -147.1 | 16.8242 | -82.0  |       |       |       |       |  |  |
| .3927                    | 16.00               | -0.689  | -79.5  | -2037  | -79.5  | -0512   | 10.5   | 7.8397  | 100.5 | 6.4169  | -138.8 | 20.3757 | -81.0  |       |       |       |       |  |  |
| .4189                    | 15.00               | -0.747  | -78.1  | -2200  | -78.1  | -0368   | 11.9   | 8.1083  | 101.9 | 5.0764  | -124.5 | 22.0116 | -79.8  |       |       |       |       |  |  |
| .4333                    | 14.50               | -0.775  | -77.2  | -2279  | -77.2  | -0271   | 12.8   | 8.1134  | 102.8 | 4.4621  | -114.5 | 22.0107 | -79.2  |       |       |       |       |  |  |
| .4488                    | 14.00               | -0.803  | -76.3  | -2356  | -76.3  | -0172   | 13.7   | 8.0542  | 103.7 | 4.0100  | -101.7 | 23.5729 | -78.5  |       |       |       |       |  |  |
| .4654                    | 13.50               | -0.828  | -75.2  | -2426  | -75.2  | -0071   | 14.8   | 7.9064  | 104.8 | 3.7076  | -86.3  | 24.2792 | -77.7  |       |       |       |       |  |  |
| .4833                    | 13.00               | -0.852  | -74.1  | -2487  | -74.1  | -0031   | 164.1  | 7.6624  | 105.9 | 3.6631  | -69.2  | 24.8990 | -76.5  |       |       |       |       |  |  |
| .5027                    | 12.50               | -0.870  | -72.8  | -2534  | -72.8  | -0132   | 162.8  | 7.2890  | 107.2 | 3.8608  | -52.8  | 25.3812 | -76.0  |       |       |       |       |  |  |
| .5236                    | 12.00               | -0.883  | -71.3  | -2561  | -71.3  | -0232   | 161.3  | 6.7777  | 108.7 | 4.2997  | -38.7  | 25.6662 | -75.1  |       |       |       |       |  |  |
| .5464                    | 11.50               | -0.886  | -69.7  | -2558  | -69.7  | -0322   | -159.7 | 6.0725  | 110.3 | 4.7578  | -27.2  | 25.6639 | -74.2  |       |       |       |       |  |  |
| .5712                    | 11.00               | -0.877  | -67.8  | -2518  | -67.8  | -0400   | -157.8 | 5.1662  | 112.2 | 5.2211  | -17.8  | 25.3042 | -73.4  |       |       |       |       |  |  |
| .5984                    | 10.50               | -0.848  | -65.6  | -2421  | -65.6  | -0458   | -155.6 | 3.9209  | 114.4 | 5.5317  | -9.6   | 24.3982 | -72.8  |       |       |       |       |  |  |
| .6263                    | 10.00               | -0.795  | -63.1  | -2250  | -63.1  | -0492   | -153.1 | 2.3688  | 116.9 | 5.6522  | -2.5   | 22.8161 | -72.7  |       |       |       |       |  |  |
| .6614                    | 9.50                | -0.709  | -60.2  | -1983  | -60.2  | -0487   | -150.2 | 4.132   | 119.8 | 5.3930  | 4.4    | 20.3959 | -73.8  |       |       |       |       |  |  |
| .6981                    | 9.00                | -0.581  | -56.8  | -1596  | -56.8  | -0436   | -146.8 | 1.9387  | -56.8 | 4.6882  | 11.5   | 17.0801 | -77.7  |       |       |       |       |  |  |
| .7392                    | 8.50                | -0.400  | -52.8  | -1062  | -52.8  | -0328   | -142.8 | 4.6982  | -52.8 | 3.4453  | 19.6   | 13.1758 | -89.1  |       |       |       |       |  |  |
| .7854                    | 8.00                | -0.158  | -48.0  | -0364  | -48.0  | -0156   | -138.0 | 7.7390  | -48.0 | 1.5779  | 33.7   | 10.7208 | -118.2 |       |       |       |       |  |  |
| .8378                    | 7.50                | -0.042  | 137.8  | -0489  | 137.8  | -0074   | 47.8   | 10.9413 | -42.2 | 0.9751  | -173.3 | 13.9363 | -152.7 |       |       |       |       |  |  |
| .8976                    | 7.00                | -0.0482 | 144.9  | -1427  | 144.9  | -0333   | 54.9   | 13.7427 | -35.1 | 3.6366  | -168.7 | 21.9777 | -165.7 |       |       |       |       |  |  |
| .9666                    | 6.50                | -0.0860 | 153.6  | -2276  | 153.6  | -0564   | 63.6   | 15.3961 | -26.4 | 5.9934  | -136.2 | 30.7005 | -164.2 |       |       |       |       |  |  |
| 1.0472                   | 6.00                | -0.076  | 164.7  | -2708  | 164.7  | -0675   | 74.7   | 14.7498 | -15.3 | 7.0644  | -122.5 | 35.9066 | -154.2 |       |       |       |       |  |  |
| 1.1424                   | 5.50                | -0.0845 | 178.9  | -2300  | 178.9  | -0587   | 68.9   | 10.6135 | -1.1  | 6.0001  | -103.3 | 32.3309 | -136.5 |       |       |       |       |  |  |
| 1.2566                   | 5.00                | -0.0351 | -162.5 | -0068  | -162.5 | -0329   | 107.5  | 3.3424  | 17.5  | 3.3374  | -62.4  | 16.6920 | -107.9 |       |       |       |       |  |  |
| 1.3563                   | 4.50                | -0.067  | 42.6   | -0174  | 132.8  | -1.5022 | -137.2 | 2.4103  | 24.8  | 4.1334  | 117.7  |         |        |       |       |       |       |  |  |
| 1.5708                   | 4.00                | -0.0226 | -102.0 | -0641  | -102.0 | -0172   | -12.0  | 3.3047  | 78.0  | 2.0285  | 136.2  | 13.3020 | -163.2 |       |       |       |       |  |  |
| 2.0944                   | 3.00                | -0.0116 | -151.3 | -0050  | -151.3 | -0182   | -61.3  | 1.293   | 28.7  | 2.1023  | 148.6  | 4.6960  | -67.4  |       |       |       |       |  |  |

\*\*\*\*\* CSCAP \*\*\*\*\*

\*\*\*\*\* CSCAP \*\*\*\*\*

DATE 85/12/09

\*\*\*\*\* SEMISUBMERSIBLE MOORING \*\*\*\*\*

## EXCITING FORCES ON VESSEL

BODY NAME = JACKY HEADING = 90.0 DEG.

| ENCOUNTER   |        | FORCE (MOMENT) / WAVE AMPLITUDE / VESSEL PASS |       | HEAVE   |       | ROLL    |       | PITCH   |       | YAW     |        |
|-------------|--------|---|-------|---------|-------|---------|-------|---------|-------|---------|--------|
| FREQUENCY   | PERIOD | SURGE   | SWAY  | AMPL.   | PHASE | AMPL.   | PHASE | AMPL.   | PHASE | AMPL.   | PHASE  |
| -(RAD/SEC)- |        | -(SEC)-                                       |       | - (SEC) |       | - (SEC) |       | - (SEC) |       | - (SEC) |        |
| 0.2513      | 25.00  | 0.000   | 90.0  | -0.1092 | -90.0 | -0.1954 | 0.0   | 5.3694  | 90.0  | 15.5408 | 180.0  |
| 0.3142      | 20.00  | 0.000   | 90.0  | -0.1595 | -90.0 | -0.1120 | 0     | 7.0756  | 90.0  | 11.2042 | 180.0  |
| 0.3307      | 19.00  | 0.006   | 90.0  | -0.1728 | -90.0 | -0.1001 | 0     | 7.4594  | 90.0  | 10.0112 | 180.0  |
| 0.3491      | 18.00  | 0.000   | 90.0  | -0.1873 | -90.0 | -0.0868 | 0     | 7.8307  | 90.0  | 8.6790  | 180.0  |
| 0.3696      | 17.00  | 0.000   | 90.0  | -0.2029 | -90.0 | -0.0719 | 0     | 8.1770  | 90.0  | 7.1936  | -179.2 |
| 0.3927      | 16.00  | 0.000   | 90.0  | -0.2193 | -90.0 | -0.0555 | 0     | 8.4355  | 90.0  | 5.5519  | -178.8 |
| 0.4189      | 15.00  | 0.000   | 90.0  | -0.2365 | -90.0 | -0.0373 | 0     | 8.7154  | 90.0  | 3.7364  | -178.1 |
| 0.4333      | 14.50  | 0.000   | 90.0  | -0.2447 | -90.0 | -0.0278 | 0     | 8.7141  | 90.0  | 2.7851  | -177.2 |
| 0.4488      | 14.00  | 0.000   | 90.0  | -0.2525 | -90.0 | -0.0180 | 0     | 8.6615  | 90.0  | 1.8087  | -175.5 |
| 0.4654      | 13.50  | 0.000   | 90.0  | -0.2596 | -90.0 | -0.0081 | 0     | 8.4693  | 90.0  | 0.8254  | -169.3 |
| 0.4833      | 13.00  | 0.000   | 90.0  | -0.2655 | -90.0 | -0.0018 | 180.0 | 8.1906  | 90.0  | 0.2465  | -41.5  |
| 0.5027      | 12.50  | 0.000   | 90.0  | -0.2697 | -90.0 | -0.0116 | 180.0 | 7.7678  | 90.0  | 1.1738  | -8.5   |
| 0.5236      | 12.00  | 0.000   | 90.0  | -0.2714 | -90.0 | -0.0210 | 180.0 | 7.1887  | 90.0  | 2.1120  | -6.7   |
| 0.5464      | 11.50  | 0.000   | 90.0  | -0.2696 | -90.0 | -0.0294 | 180.0 | 6.3670  | 90.0  | 2.9493  | -5.1   |
| 0.5712      | 11.00  | 0.000   | 90.0  | -0.2632 | -90.0 | -0.0365 | 180.0 | 5.3317  | 90.0  | 3.6620  | -4.4   |
| 0.5984      | 10.50  | 0.000   | 90.0  | -0.2498 | -90.0 | -0.0414 | 180.0 | 3.9594  | 90.0  | 4.1523  | -4.1   |
| 0.6283      | 10.00  | 0.000   | 90.0  | -0.2275 | -90.0 | -0.0435 | 180.0 | 2.1129  | 90.0  | 4.3623  | -4.7   |
| 0.6614      | 9.50   | 0.000   | 90.0  | -0.1934 | -90.0 | -0.0414 | 180.0 | 1.1616  | -90.0 | 4.1587  | -5.2   |
| 0.6981      | 9.00   | 0.000   | 90.0  | -0.1440 | -90.0 | -0.0343 | 180.0 | 2.9496  | -90.0 | 3.4473  | -6.4   |
| 0.7392      | 8.50   | 0.000   | 90.0  | -0.0755 | -90.0 | -0.0209 | 180.0 | 6.2951  | -90.0 | 2.1307  | -11.2  |
| 0.7654      | 8.00   | 0.000   | -90.0 | -0.0154 | 90.0  | -0.0006 | 180.0 | 10.1300 | -90.0 | 4.0336  | -82.0  |
| 0.8378      | 7.50   | 0.000   | -90.0 | -0.1299 | 90.0  | -0.0261 | 0     | 14.4242 | -90.0 | 2.6366  | -172.3 |
| 0.8976      | 7.00   | 0.000   | -90.0 | -0.2626 | 90.0  | -0.0560 | 0     | 18.6586 | -90.0 | 5.6089  | -177.4 |
| 0.9666      | 6.50   | 0.000   | -90.0 | -0.3952 | 90.0  | -0.0822 | 0     | 22.0907 | -90.0 | 8.2184  | -179.4 |
| 1.0472      | 6.00   | 0.000   | -90.0 | -0.4846 | 90.0  | -0.0932 | 0     | 23.1707 | -90.0 | 9.3178  | 178.6  |
| 1.1424      | 5.50   | 0.000   | -90.0 | -0.4529 | 90.0  | -0.0772 | 0     | 19.2598 | -90.0 | 7.7480  | 174.0  |
| 1.2566      | 5.00   | 0.000   | -90.0 | -0.2046 | 90.0  | -0.0363 | 0     | 16.6614 | -90.0 | 3.8704  | 159.7  |
| 1.3963      | 4.50   | 0.000   | 90.0  | -0.2352 | -90.0 | -0.0056 | 0     | 16.5574 | 90.0  | 1.9544  | 106.7  |
| 1.5708      | 4.00   | 0.000   | 90.0  | -0.3694 | -90.0 | -0.0235 | 0     | 21.3785 | 90.0  | 2.7409  | 169.0  |
| 2.0944      | 3.00   | 0.000   | 90.0  | -0.3026 | -90.0 | -0.0045 | 180.0 | 19.0302 | 90.0  | 0.9555  | -62.1  |

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DATE 85/12/00

# SEMISUBMERSIBLE MODLING

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## EXCITING FORCES ON VESSEL

BUDY NAME = JACKY

HEADING = 112.5 DEG.

## ENCOUNTER FORCE (MOMENT) / WAVE AMPLITUDE / VESSEL MASS

| FREQUENCY<br>-(RAD/SEC)- | PERIOD<br>-(SEC)- | SURGE   |        |       | SWAY   |         |        | HEAVE   |        |         | ROLL   |         |        | PITCH |       |       | YAW   |  |  |
|--------------------------|-------------------|---------|--------|-------|--------|---------|--------|---------|--------|---------|--------|---------|--------|-------|-------|-------|-------|--|--|
|                          |                   | AMPL.   | PHASE  | AMPL. | PHASE  | AMPL.   | PHASE  | AMPL.   | PHASE  | AMPL.   | PHASE  | AMPL.   | PHASE  | AMPL. | PHASE | AMPL. | PHASE |  |  |
| •2513                    | 25.00             | •0.338  | 85.5   | •1010 | -94.9  | •1354   | -4.9   | 4.9605  | 85.5   | 15.6337 | 168.8  | 10.0999 | -93.8  |       |       |       |       |  |  |
| •3142                    | 20.00             | •0.496  | 83.3   | •1477 | -96.7  | •1120   | -6.7   | 6.5372  | 83.3   | 11.4901 | 160.4  | 14.7720 | -95.7  |       |       |       |       |  |  |
| •3307                    | 19.00             | •0.538  | 82.5   | •1601 | -97.5  | •1001   | -7.5   | 6.8925  | 82.5   | 10.3630 | 157.5  | 16.0076 | -96.5  |       |       |       |       |  |  |
| •3491                    | 18.00             | •0.585  | 81.7   | •1736 | -98.3  | •0867   | -8.3   | 7.2364  | 81.7   | 9.1323  | 153.5  | 17.3608 | -97.2  |       |       |       |       |  |  |
| •3696                    | 17.00             | •0.635  | 80.7   | •1882 | -99.3  | •0720   | -9.3   | 7.5205  | 80.7   | 7.7769  | 148.4  | 18.8242 | -98.0  |       |       |       |       |  |  |
| •3927                    | 16.00             | •0.689  | 79.5   | •2037 | -10.5  | 7.7583  | 79.5   | 6.3474  | 160.5  | 20.3757 | -99.0  |         |        |       |       |       |       |  |  |
| •4184                    | 15.00             | •0.747  | 78.1   | •2200 | -101.9 | •0373   | -11.9  | 8.0182  | 78.1   | 4.9564  | 126.8  | 22.0116 | -100.2 |       |       |       |       |  |  |
| •4333                    | 14.50             | •0.775  | 77.2   | •2279 | -102.8 | •0277   | -12.8  | 8.0185  | 77.2   | 4.3244  | 117.0  | 22.8069 | -100.8 |       |       |       |       |  |  |
| •4488                    | 14.00             | •0.803  | 76.3   | •2356 | -103.7 | •0178   | -13.7  | 7.9546  | 76.3   | 3.8068  | 104.2  | 23.5729 | -101.3 |       |       |       |       |  |  |
| •4654                    | 13.50             | •0.628  | 75.2   | •2426 | -104.8 | •0078   | -14.8  | 7.8019  | 75.2   | 3.4508  | 88.3   | 24.2792 | -102.3 |       |       |       |       |  |  |
| •4833                    | 13.00             | •0.852  | 74.1   | •2487 | -105.5 | •0023   | 164.1  | 7.5332  | 74.1   | 3.3615  | 70.2   | 24.8889 | -103.1 |       |       |       |       |  |  |
| •5027                    | 12.50             | •0.670  | 72.8   | •2534 | -107.2 | •0123   | 162.8  | 7.1761  | 72.8   | 3.5317  | 52.5   | 25.3812 | -104.0 |       |       |       |       |  |  |
| •5236                    | 12.00             | •0.683  | 71.3   | •2561 | -108.7 | •0217   | 161.3  | 6.6416  | 71.3   | 3.8447  | 37.0   | 25.6642 | -104.5 |       |       |       |       |  |  |
| •5464                    | 11.50             | •0.686  | 69.7   | •2558 | -110.3 | •0304   | 159.7  | 5.9130  | 69.7   | 4.2948  | 24.6   | 25.6638 | -105.8 |       |       |       |       |  |  |
| •5712                    | 11.00             | •0.677  | 67.8   | •2518 | -112.4 | •0380   | 157.8  | 5.0059  | 67.8   | 4.7495  | 14.7   | 25.3042 | -106.6 |       |       |       |       |  |  |
| •5984                    | 10.50             | •0.648  | 65.6   | •2421 | -114.4 | •0435   | 155.6  | 3.7639  | 65.6   | 5.0476  | 6.2    | 24.3992 | -107.2 |       |       |       |       |  |  |
| •6283                    | 10.00             | •0.795  | 63.1   | •2250 | -116.5 | •0461   | 153.1  | 2.2040  | 63.1   | 5.0895  | -1.9   | 22.8161 | -107.3 |       |       |       |       |  |  |
| •6614                    | 9.50              | •0.709  | 60.2   | •1983 | -119.8 | •0451   | 150.2  | 2.2705  | 60.2   | 4.8075  | -9.5   | 20.3959 | -106.2 |       |       |       |       |  |  |
| •6981                    | 9.00              | •0.581  | 56.8   | •1596 | -123.2 | •0394   | 146.8  | 2.0423  | -123.2 | 4.0806  | -17.9  | 17.0801 | -102.3 |       |       |       |       |  |  |
| •7392                    | 8.50              | •0.400  | 52.8   | •1062 | -127.2 | •0278   | 142.8  | 4.7286  | -127.2 | 2.7966  | -30.1  | 13.1758 | -90.9  |       |       |       |       |  |  |
| •7854                    | 8.00              | •0.158  | 48.0   | •0364 | -132.0 | •0100   | 138.0  | 7.6899  | -132.0 | 1.0874  | -65.4  | 10.7208 | -61.8  |       |       |       |       |  |  |
| •8378                    | 7.50              | •0.142  | 417.8  | •0489 | 42.2   | •0132   | -47.8  | 10.7043 | -137.8 | 1.7984  | 174.8  | 13.9363 | -27.3  |       |       |       |       |  |  |
| •8976                    | 7.00              | •0.0482 | -144.9 | •1427 | 35.1   | •0386   | -54.9  | 13.2376 | -144.9 | 4.3118  | 151.1  | 21.9477 | -14.3  |       |       |       |       |  |  |
| •9666                    | 6.50              | •0.000  | -153.6 | •2276 | 26.4   | •0599   | -63.6  | 14.5646 | -153.6 | 6.3961  | 136.9  | 30.7004 | -15.8  |       |       |       |       |  |  |
| 1.0472                   | 6.00              | •0.976  | -164.7 | •2708 | 15.3   | •0663   | -74.7  | 13.4862 | -164.7 | 6.9322  | -122.4 | 35.9063 | -25.7  |       |       |       |       |  |  |
| 1.1424                   | 5.50              | •0.845  | -178.9 | •2300 | 1.1    | •0482   | -88.9  | 8.9429  | -178.9 | 4.9322  | -103.6 | 32.3308 | -43.9  |       |       |       |       |  |  |
| 1.2566                   | 5.00              | •0.351  | 162.5  | •0968 | -17.5  | •0084   | -107.5 | 1.6235  | 162.5  | •9405   | 45.1   | 16.6920 | -72.1  |       |       |       |       |  |  |
| 1.3963                   | 4.50              | •62.8   | -137.8 | •0281 | 47.2   | •2.3674 | -42.8  | 2.9123  | -117.5 | 6.1333  | 62.3   |         |        |       |       |       |       |  |  |
| 1.5708                   | 4.00              | •0.224  | 102.0  | •0641 | -78.6  | •0392   | 12.0   | 3.8299  | 102.0  | 4.3272  | 166.4  | 13.3020 | -16.8  |       |       |       |       |  |  |
| 2.0944                   | 3.00              | •0.016  | 151.3  | •0050 | -28.7  | •0140   | -118.7 | •8260   | -28.7  | 2.0315  | 107.9  | 4.6963  | -112.6 |       |       |       |       |  |  |

OSCAR \*\*\*

DATE 05/12/09

SEMISUBMERSIBLE MOORING

## EXCITING FORCES ON VESSEL

BODY NAME = JACKY

HEADING = 135.0 DEG.

| ENCOUNTER                |                   | FORCE (MOMENT) / WAVE AMPLITUDE / VESSEL MASS |        |       |        |       |        |        |        |         |        |         |        |
|--------------------------|-------------------|---|--------|-------|--------|-------|--------|--------|--------|---------|--------|---------|--------|
| FREQUENCY<br>-(RAD/SEC)- | PERIOD<br>-(SEC)- | AMPL.   | PHASE  | AMPL. | PHASE  | AMPL. | PHASE  | AMPL.  | PHASE  | AMPL.   | PHASE  | AMPL.   | PHASE  |
| •2513                    | 25.00             | •0625   | 81.8   | •0775 | -98.2  | •1555 | -8.2   | 3.7963 | 81.8   | 15.9240 | 150.4  | 7.7487  | -97.1  |
| •3142                    | 20.00             | •0520   | 77.5   | •1136 | -102.5 | •1120 | -12.5  | 5.0037 | 77.5   | 12.1596 | 144.6  | 11.3702 | -100.7 |
| •3307                    | 19.00             | •0599   | 76.2   | •1232 | -103.8 | •1001 | -13.8  | 5.2767 | 76.2   | 11.1767 | 139.8  | 12.3305 | -102.1 |
| •3491                    | 18.00             | •1086   | 74.7   | •1339 | -105.3 | •0866 | -15.3  | 5.5409 | 74.7   | 10.1590 | 133.2  | 13.3939 | -103.4 |
| •3696                    | 17.00             | •1181   | 72.8   | •1454 | -107.2 | •0716 | -17.2  | 5.7186 | 72.8   | 9.0939  | 124.9  | 14.5546 | -105.0 |
| •3927                    | 16.00             | •1264   | 70.6   | •1578 | -109.4 | •0552 | -19.4  | 5.9000 | 70.6   | 8.0416  | 113.9  | 15.7046 | -107.6 |
| •4189                    | 15.00             | •1396   | 67.9   | •1711 | -112.1 | •0366 | -22.1  | 6.1017 | 67.9   | 7.2346  | 98.3   | 17.1321 | -109.3 |
| •4333                    | 14.50             | •1451   | 66.4   | •1777 | -113.6 | •0267 | -23.6  | 6.1045 | 66.4   | 6.9050  | 89.2   | 17.7984 | -110.6 |
| •4488                    | 14.00             | •1506   | 64.7   | •1842 | -115.3 | •0166 | -25.3  | 6.0599 | 64.7   | 6.6739  | 79.0   | 16.4561 | -112.6 |
| •4654                    | 13.50             | •1559   | 62.7   | •1904 | -117.3 | •0062 | -27.3  | 5.9525 | 62.7   | 6.5207  | 68.2   | 19.0801 | -113.7 |
| •4833                    | 13.00             | •1609   | 60.6   | •1962 | -119.4 | •0064 | 150.6  | 5.7739 | 60.6   | 6.5231  | 96.8   | 16.6647 | -115.4 |
| •5027                    | 12.50             | •1652   | 58.2   | •2011 | -121.8 | •0150 | 148.2  | 5.5031 | 58.2   | 6.6387  | 45.2   | 20.1729 | -117.4 |
| •5236                    | 12.00             | •1686   | 55.5   | •2049 | -124.5 | •0251 | 145.5  | 5.0947 | 55.5   | 6.7978  | 33.8   | 20.5661 | -119.5 |
| •5464                    | 11.50             | •1706   | 52.4   | •2069 | -127.6 | •0348 | 142.4  | 4.5747 | 52.4   | 7.0309  | 22.7   | 20.7903 | -121.9 |
| •5712                    | 11.00             | •1708   | 48.9   | •2067 | -131.1 | •0437 | 138.9  | 3.9414 | 48.9   | 7.2903  | 12.1   | 20.8035 | -124.5 |
| •5984                    | 10.50             | •1681   | 44.9   | •2029 | -135.1 | •0509 | 134.9  | 3.0772 | 44.9   | 7.4001  | 1.5    | 20.4771 | -127.3 |
| •6283                    | 10.00             | •1610   | 40.3   | •1947 | -139.7 | •0556 | 130.3  | 1.9954 | 40.3   | 7.2938  | -9.3   | 19.7306 | -130.3 |
| •6614                    | 9.50              | •1506   | 35.0   | •1807 | -145.0 | •0573 | 125.0  | •7069  | 35.0   | 6.9354  | -20.7  | 18.4500 | -133.4 |
| •6981                    | 9.00              | •1335   | 28.7   | •1598 | -151.3 | •0550 | 118.7  | •7683  | -151.3 | 6.2294  | -33.3  | 13.5153 | -136.2 |
| •7392                    | 8.50              | •1092   | 21.2   | •1304 | -158.8 | •0474 | 111.2  | 2.4047 | -158.8 | 5.0551  | -48.5  | 13.9705 | -137.7 |
| •7654                    | 8.00              | •0777   | 12.4   | •0926 | -167.6 | •0346 | 102.6  | 4.0341 | -167.6 | 3.5008  | -69.3  | 10.9019 | -135.8 |
| •8378                    | 7.50              | •6406   | 1.7    | •0484 | -178.3 | •0171 | 91.7   | 5.3967 | -178.3 | 1.8235  | -108.6 | 8.1125  | -124.9 |
| •8976                    | 7.00              | •0334   | -11.4  | •0041 | 168.6  | •0027 | -101.4 | 6.0429 | 168.6  | 1.3606  | 157.1  | 7.1422  | -104.6 |
| •9666                    | 6.50              | •0219   | 152.4  | •0271 | -27.6  | •0195 | -117.6 | 5.3680 | 152.4  | 2.2307  | 91.3   | 7.8414  | -97.3  |
| 1.0472                   | 6.00              | •0168   | 132.0  | •0254 | -48.0  | •0259 | -138.0 | 2.6997 | 132.0  | 2.6815  | -26.6  | 7.1919  | -117.3 |
| 1.1424                   | 5.50              | •0317   | -74.2  | •0228 | 105.8  | •0166 | -164.2 | 1.7559 | -74.2  | 4.3346  | -51.7  | 5.1216  | 169.4  |
| 1.2566                   | 5.00              | •0526   | -108.7 | •0842 | 71.3   | •0008 | -18.7  | 5.3759 | -108.7 | 6.4929  | -109.4 | 8.4257  | 73.8   |
| 1.3563                   | 4.50              | •0596   | -155.3 | •0516 | 24.7   | •0034 | -65.3  | 2.4927 | -155.3 | 2.8630  | -162.2 | 7.4811  | -21.7  |
| 1.5708                   | 4.00              | •0225   | 139.5  | •0029 | -40.5  | •0194 | 49.5   | 1.0721 | -40.5  | 2.1346  | -105.8 | 8.8380  | -128.6 |
| 2.0944                   | 3.00              | •0225   | -101.9 | •0203 | 78.1   | •0106 | -11.9  | 1.205  | 78.1   | 3.4572  | -119.8 | 9.3389  | 155.5  |

\*\*\*\*\* OSCAR \*\*\*\*\*  
 \* SEMISUBMERSIBLE MUDRING

DATE 8/5/12/00

## ENCOUNTER FORCE IN HORIZONTAL WAVE AMPLITUDE / VESSEL MASS

EXCITING FORCES ON VESSEL  
 BODY NAME = JACKY  
 HEADING = 157.5 DEG.

| FREQUENCY<br>(RAD/SEC) | PERIOD<br>(SEC) | SURGE |        | SWAY  |        | HEAVE |        | ROLL   |        | PITCH   |        | YAW     |        | AMPL. PHASE |       | AMPL. PHASE |       | AMPL. PHASE |       | AMPL. PHASE |       |
|------------------------|-----------------|-------|--------|-------|--------|-------|--------|--------|--------|---------|--------|---------|--------|-------------|-------|-------------|-------|-------------|-------|-------------|-------|
|                        |                 | AMPL. | PHASE  | AMPL. | PHASE  | AMPL. | PHASE  | AMPL.  | PHASE  | AMPL.   | PHASE  | AMPL.   | PHASE  | AMPL.       | PHASE | AMPL.       | PHASE | AMPL.       | PHASE | AMPL.       | PHASE |
| 2513                   | 25.00           | .0818 | 79.3   | .0420 | -100.7 | .1356 | -10.7  | 2.0343 | 79.3   | 16.1914 | 153.2  | 4.2035  | -99.3  |             |       |             |       |             |       |             |       |
| 3142                   | 20.00           | .1206 | 73.7   | .0616 | -106.3 | .1119 | -16.3  | 2.7079 | 73.7   | 12.8030 | 134.7  | 6.1974  | -104.6 |             |       |             |       |             |       |             |       |
| 3307                   | 19.00           | .1310 | 72.0   | .0671 | -106.6 | .1000 | -10.0  | 2.0561 | 72.0   | 11.9477 | 128.0  | 6.7145  | -105.6 |             |       |             |       |             |       |             |       |
| 3491                   | 18.00           | .1426 | 69.9   | .0730 | -110.1 | .0865 | -20.1  | 2.9994 | 69.9   | 11.1104 | 121.0  | 7.3061  | -107.7 |             |       |             |       |             |       |             |       |
| 3696                   | 17.00           | .1554 | 67.5   | .0794 | -112.5 | .0714 | -22.5  | 3.0413 | 67.5   | 10.2860 | 111.5  | 7.9525  | -109.8 |             |       |             |       |             |       |             |       |
| 3927                   | 16.00           | .1691 | 64.6   | .0864 | -115.4 | .0546 | -25.4  | 3.1342 | 64.6   | 9.5002  | 99.7   | 8.6491  | -112.6 |             |       |             |       |             |       |             |       |
| 4189                   | 15.00           | .1843 | 61.2   | .0940 | -118.6 | .0356 | -28.8  | 3.2384 | 61.2   | 9.0469  | 84.3   | 9.4129  | -115.7 |             |       |             |       |             |       |             |       |
| 4333                   | 14.50           | .1919 | 59.1   | .0978 | -120.6 | .0255 | -30.9  | 3.2371 | 59.1   | 9.8714  | 75.8   | 9.7997  | -117.6 |             |       |             |       |             |       |             |       |
| 4488                   | 14.00           | .1995 | 56.9   | .1017 | -123.1 | .0149 | -33.1  | 3.2105 | 56.9   | 9.7736  | 66.7   | 10.1872 | -119.7 |             |       |             |       |             |       |             |       |
| 4654                   | 13.50           | .2070 | 54.4   | .1054 | -125.6 | .0042 | -35.6  | 3.1514 | 54.4   | 8.7124  | 57.1   | 10.5999 | -122.6 |             |       |             |       |             |       |             |       |
| 4833                   | 13.00           | .2141 | 51.6   | .1090 | -128.4 | .0070 | 141.6  | 3.0535 | 51.6   | 8.7761  | 47.0   | 10.9214 | -124.6 |             |       |             |       |             |       |             |       |
| 5027                   | 12.50           | .2205 | 48.5   | .1122 | -131.3 | .0183 | 138.5  | 2.9069 | 48.5   | 9.9083  | 36.6   | 11.2502 | -127.6 |             |       |             |       |             |       |             |       |
| 5236                   | 12.00           | .2260 | 46.9   | .1150 | -135.1 | .0294 | 134.9  | 2.6520 | 44.9   | 9.0694  | 26.0   | 11.5266 | -131.0 |             |       |             |       |             |       |             |       |
| 5466                   | 11.50           | .2297 | 40.9   | .1169 | -139.1 | .0403 | 130.9  | 2.3716 | 40.9   | 9.2431  | 15.1   | 11.7219 | -134.8 |             |       |             |       |             |       |             |       |
| 5712                   | 11.00           | .2315 | 36.4   | .1178 | -143.6 | .0506 | 126.4  | 2.0350 | 36.4   | 9.4427  | 4.0    | 11.8134 | -139.4 |             |       |             |       |             |       |             |       |
| 5984                   | 10.50           | .2292 | 31.1   | .1170 | -148.6 | .0293 | 121.1  | 1.2764 | 31.1   | 9.4649  | -7.8   | 11.7275 | -144.7 |             |       |             |       |             |       |             |       |
| 6283                   | 10.00           | .2230 | 25.1   | .1139 | -154.9 | .0663 | 115.1  | 9.9817 | 25.1   | 9.2804  | -20.5  | 11.4135 | -151.2 |             |       |             |       |             |       |             |       |
| 6614                   | 9.50            | .2103 | 18.1   | .1078 | -161.8 | .0705 | 108.1  | .3049  | 18.1   | 9.8397  | -34.8  | 10.7942 | -159.3 |             |       |             |       |             |       |             |       |
| 6981                   | 9.00            | .1696 | 9.9    | .0980 | -170.1 | .0710 | 99.9   | .4616  | -170.1 | 9.0834  | -51.5  | 9.7970  | -169.7 |             |       |             |       |             |       |             |       |
| 7392                   | 8.50            | .1566 | .2     | .0832 | -179.6 | .0664 | 90.2   | 1.3294 | -179.6 | 6.9334  | -73.0  | 8.3491  | 175.6  |             |       |             |       |             |       |             |       |
| 7854                   | 6.00            | .1164 | -11.4  | .0630 | 168.6  | .0562 | 78.6   | 2.1762 | 168.6  | 5.6238  | -103.3 | 6.5598  | 152.3  |             |       |             |       |             |       |             |       |
| 8378                   | 7.50            | .0626 | -25.4  | .0372 | 154.6  | .0402 | 64.6   | 2.8947 | 154.6  | 4.7795  | -148.1 | 5.2009  | 110.3  |             |       |             |       |             |       |             |       |
| 8976                   | 7.00            | .0012 | -42.4  | .0077 | 137.6  | .0194 | 47.6   | 3.2930 | 137.6  | 5.2294  | 159.4  | 6.2120  | 54.6   |             |       |             |       |             |       |             |       |
| 9666                   | 6.50            | .0566 | 116.4  | .0207 | -63.6  | .0022 | -153.6 | 3.1119 | 116.4  | 6.3012  | 114.4  | 9.5449  | 13.6   |             |       |             |       |             |       |             |       |
| 1.0472                 | 6.00            | .0095 | 89.7   | .0384 | -90.3  | .0179 | 179.7  | 2.1277 | 89.7   | 6.4581  | 73.7   | 12.8065 | -117.1 |             |       |             |       |             |       |             |       |
| 1.1424                 | 5.50            | .0739 | 55.5   | .0345 | -124.5 | .0199 | 145.5  | .4451  | 55.5   | 4.0811  | 26.3   | 12.7973 | -50.2  |             |       |             |       |             |       |             |       |
| 1.2566                 | 5.00            | .0241 | 10.4   | .0134 | -169.6 | .0064 | 100.4  | .8114  | -169.6 | .6404   | -82.4  | 5.9210  | -94.8  |             |       |             |       |             |       |             |       |
| 1.3963                 | 4.50            | .0710 | -50.5  | .9275 | 129.5  | .0105 | -140.5 | 1.2676 | -50.5  | 3.4047  | -32.5  | 12.0002 | 52.6   |             |       |             |       |             |       |             |       |
| 1.5708                 | 4.00            | .3052 | -135.6 | .1169 | 44.4   | .0173 | 134.4  | 7.2343 | -135.6 | 10.8509 | -130.3 | 2.0170  | -15.1  |             |       |             |       |             |       |             |       |
| 2.0944                 | 3.00            | .0190 | -91.1  | .0077 | 88.9   | .0163 | -1.1   | 1.9173 | -91.1  | 1.9717  | -147.1 | 11.4620 | 175.1  |             |       |             |       |             |       |             |       |

44# OSCAP \*\*\*

SEMIIMMERSIBLE MOKING

DATE 95/12/09

## ENCOUNTER FORCE CHONVENTIONAL WAVE AMPLITUDE / VESSEL MASS

EXCITING FORCES ON VESSEL

BODY NAME = JACKY

HEADING = 180.0 DEG.

| FREQUENCY<br>-RAD/SEC- | PERIOD<br>-(SEC)- | SWAY  |       |       | HEAVE |       |        | ROLL  |        |         | PITCH  |        |        | YAW    |        |  |
|------------------------|-------------------|-------|-------|-------|-------|-------|--------|-------|--------|---------|--------|--------|--------|--------|--------|--|
|                        |                   | AMPL. | PHASE | AMPL. | PHASE | AMPL. | PHASE  | AMPL. | PHASE  | AMPL.   | PHASE  | AMPL.  | PHASE  | AMPL.  | PHASE  |  |
| • 2513                 | 25.00             | •0886 | 78.4  | •0000 | 78.4  | •1556 | -11.6  | •0000 | -101.6 | 16.3013 | 151.1  | •0000  | 79.5   | •0000  | 79.5   |  |
| • 3142                 | 20.00             | •1307 | 72.4  | •0000 | 72.4  | •1119 | -17.6  | •0000 | -107.6 | 13.0628 | 131.3  | •0000  | 74.0   | •0000  | 74.0   |  |
| • 3307                 | 19.00             | •1420 | 70.5  | •0000 | 70.5  | •1000 | -19.5  | •0000 | -109.5 | 12.2565 | 125.2  | •0000  | 72.7   | •0000  | 72.7   |  |
| • 3491                 | 18.00             | •1547 | 68.3  | •0000 | 68.3  | •0664 | -21.7  | •0000 | -111.7 | 11.4667 | 117.1  | •0000  | 70.8   | •0000  | 70.8   |  |
| • 3696                 | 17.00             | •1686 | 65.7  | •0000 | 65.7  | •0711 | -24.3  | •1004 | -114.3 | 10.7616 | 107.0  | •0000  | 68.4   | •0000  | 68.4   |  |
| • 3927                 | 16.00             | •1836 | 62.6  | •0000 | 62.6  | •0541 | -27.4  | •1126 | -117.4 | 10.0714 | 95.1   | •0000  | 65.4   | •0000  | 65.4   |  |
| • 4189                 | 15.00             | •2002 | 58.8  | •0000 | 58.8  | •0349 | -31.2  | •1270 | -121.2 | 9.7405  | 79.8   | •0000  | 61.5   | •0000  | 61.5   |  |
| • 4333                 | 14.50             | •2086 | 56.6  | •0000 | 56.6  | •0247 | -33.4  | •1351 | -123.4 | 9.6171  | 71.4   | •0000  | 59.6   | •0000  | 59.6   |  |
| • 4448                 | 14.00             | •2171 | 54.2  | •0000 | 54.2  | •0139 | -35.8  | •1440 | -125.0 | 9.5677  | 62.5   | •0000  | 57.5   | •0000  | 57.5   |  |
| • 4654                 | 13.50             | •2253 | 51.5  | •0000 | 51.5  | •0030 | -38.5  | •1936 | -128.5 | 9.5373  | 53.2   | •0000  | 56.8   | •0000  | 56.8   |  |
| • 4833                 | 13.00             | •2332 | 48.4  | •0000 | 48.4  | •0085 | 138.4  | •1641 | -131.6 | 9.6274  | 43.4   | •0000  | 51.5   | •0000  | 51.5   |  |
| • 5027                 | 12.50             | •2405 | 45.0  | •0000 | 45.0  | •0201 | 135.0  | •1754 | -135.0 | 9.7739  | 33.1   | •0000  | 48.5   | •0000  | 48.5   |  |
| • 5236                 | 12.00             | •2466 | 41.2  | •0000 | 41.2  | •0319 | 131.2  | •2501 | -138.8 | 9.9579  | 22.6   | •0000  | 44.7   | •0000  | 44.7   |  |
| • 5464                 | 11.50             | •2510 | 36.9  | •0000 | 36.9  | •0433 | 126.9  | •2675 | -143.1 | 10.1281 | 11.6   | •0000  | 40.1   | •0000  | 40.1   |  |
| • 5712                 | 11.00             | •2532 | 31.9  | •0000 | 31.9  | •0543 | 121.9  | •2858 | -148.1 | 10.3150 | •2     | •0000  | 34.8   | •0000  | 34.8   |  |
| • 5984                 | 10.50             | •2513 | 26.3  | •0000 | 26.3  | •0640 | 116.3  | •3049 | -153.7 | 10.3076 | -12.1  | •0000  | 28.3   | •0000  | 28.3   |  |
| • 6283                 | 10.00             | •2442 | 19.8  | •0000 | 19.8  | •0720 | 109.8  | •3646 | -160.2 | 10.1018 | -25.7  | •0000  | 20.3   | •0000  | 20.3   |  |
| • 6614                 | 9.50              | •2299 | 12.2  | •0000 | 12.2  | •0773 | 102.2  | •3950 | -167.8 | 9.6142  | -41.3  | •0000  | 10.1   | •0000  | 10.1   |  |
| • 6981                 | 9.00              | •2061 | 2.3   | •0000 | 2.3   | •0789 | 93.3   | •4024 | -176.7 | 8.8179  | -60.2  | •0000  | 3.8    | •0000  | 3.8    |  |
| • 7392                 | 8.50              | •1697 | -7.2  | •0000 | -7.2  | •0754 | 82.8   | •4410 | 172.8  | 7.7104  | -85.3  | •0000  | -24.1  | •0000  | -24.1  |  |
| • 7854                 | 8.00              | •1176 | -19.8 | •0000 | -19.8 | •0657 | 70.2   | •4401 | 160.2  | 6.7062  | -121.1 | •0000  | -56.2  | •0000  | -56.2  |  |
| • 8376                 | 7.50              | •0483 | -34.9 | •0000 | -34.9 | •0900 | 55.1   | •4178 | 145.1  | 6.8349  | -169.0 | •0000  | -101.6 | •0000  | -101.6 |  |
| • 8976                 | 7.00              | •0371 | 126.6 | •0000 | 126.6 | •0256 | 36.6   | •3606 | 126.6  | 8.8605  | 143.4  | •0000  | -146.3 | •0000  | -146.3 |  |
| • 9666                 | 6.50              | •128C | 103.7 | •0000 | 103.7 | •0019 | -166.3 | •2508 | 103.7  | 11.8117 | 102.8  | •00001 | 117.1  | •00001 | 117.1  |  |
| 1.0472                 | 6.00              | •1659 | 74.9  | •0000 | 74.9  | •0265 | 164.9  | •0712 | 74.9   | 13.5170 | -63.5  | •0001  | 141.3  | •0001  | 141.3  |  |
| 1.1424                 | 5.50              | •1831 | 37.8  | •0000 | 37.8  | •0377 | 127.8  | •1743 | -162.2 | 10.7221 | 17.2   | •0001  | 96.1   | •0001  | 96.1   |  |
| 1.2566                 | 5.00              | •0087 | -11.0 | •0000 | -11.0 | •0259 | 79.0   | •4039 | 169.0  | 3.0380  | -132.6 | •0000  | -97.2  | •0000  | -97.2  |  |
| 1.3963                 | 4.50              | •3296 | 103.1 | •0000 | 103.1 | •0020 | -166.9 | •3689 | 103.1  | 21.2314 | 102.6  | •00002 | -178.3 | •00002 | -178.3 |  |
| 1.5708                 | 4.00              | •4538 | 11.0  | •0000 | 11.0  | •0100 | 101.0  | •1912 | -169.0 | 27.4223 | 8.9    | •0003  | 89.0   | •0003  | 89.0   |  |
| 2.0944                 | 3.00              | •3882 | 24.5  | •0000 | 29.5  | •0111 | -60.5  | •2666 | 29.5   | 25.0930 | 32.0   | •0005  | 113.2  | •0005  | 113.2  |  |

\*\*\* OSCAR \*\*\*

SEMIIMMERSIBLE MOORING

DATE 05/12/09

## WAVE DRIFT FORCE

BODY NAME = JACKY BODY TYPE = SEMI

DRIFT FORCE ( KIPS ) / ( WAVE AMPLITUDE )\*\*2

## ENCOUNTER HEAD SEAS

| FREQUENCY<br>- (RAD/SEC) - | PERIOD<br>- (SEC) - | - SURGE - | - HEAVE - | - PITCH - | - SWAY - | - HEAVE - | - ROLL - | - YAW - |
|----------------------------|---------------------|-----------|-----------|-----------|----------|-----------|----------|---------|
| .2513                      | 25.000              | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .3142                      | 20.000              | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .3307                      | 19.000              | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .3491                      | 18.000              | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .3696                      | 17.000              | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .3927                      | 16.000              | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .4169                      | 15.000              | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .4333                      | 14.500              | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .4486                      | 14.000              | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .4654                      | 13.500              | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .4833                      | 13.000              | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .5027                      | 12.500              | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .5236                      | 12.000              | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .5466                      | 11.500              | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .5712                      | 11.000              | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .5984                      | 10.500              | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .6283                      | 10.000              | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .6614                      | 9.500               | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .6981                      | 9.000               | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .7392                      | 8.500               | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .7854                      | 8.000               | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .8376                      | 7.500               | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .8976                      | 7.000               | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| .9666                      | 6.500               | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| 1.0472                     | 6.000               | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| 1.1424                     | 5.500               | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| 1.2566                     | 5.000               | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| 1.3963                     | 4.500               | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| 1.5708                     | 4.000               | .00       | .00       | .00       | .00      | .00       | .00      | .00     |
| 2.0944                     | 3.000               | .00       | .00       | .00       | .00      | .00       | .00      | .00     |

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\* 44 CSCAP \*\*\*  
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\* SEHISUBMERSIBLE MOORING  
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DATE 05/12/09

## FLDORING LINE PROPERTIES

| NAME    | LINE      | TYPE     | LENGTH OF FIRST SEG. | FEET | BODY   | COORDINATES |         |       | CONNECTIONS |          |          |
|---------|-----------|----------|----------------------|------|--------|-------------|---------|-------|-------------|----------|----------|
|         |           |          |                      |      |        | X           | Y       | Z     | NAME        | NAME     | NAME     |
| LEG1    | CHAIN     | REDEFINE | 1349.                |      | JACK V | 0.00        | 88.00   | 37.00 | GROUND      | -1280.97 | 88.00    |
| LEG2    | WIRE      | REDEFINE | 4270.                |      | JACK V | 4.00        | 96.00   | 37.00 | GROUND      | -2998.72 | 3098.72  |
| LEG3    | WIRE/CHAI | REDEFINE | 4790.                |      | JACK V | 100.00      | 100.00  | 37.00 | GROUND      | 100.00   | 5408.09  |
| LEG4    | WIRE      | REDEFINE | 4270.                |      | JACK V | 196.00      | 96.00   | 37.00 | GROUND      | 3198.72  | 350.00   |
| LEG5    | CHAIN     | REDEFINE | 1349.                |      | JACK V | 200.00      | 98.00   | 37.00 | GROUND      | 1480.97  | 88.00    |
| LEG6    | CHAIN     | ACTIVE   | 1349.                |      | JACK V | 200.00      | -88.00  | 37.00 | GROUND      | 1481.00  | -88.00   |
| LEG7    | WIRE      | ACTIVE   | 4270.                |      | JACK V | 196.00      | -96.00  | 37.00 | GROUND      | 3199.08  | -3099.08 |
| LEG8    | WIRE/CHAI | ACTIVE   | 4790.                |      | JACK V | 100.00      | -100.00 | 37.00 | GROUND      | 100.00   | -5416.00 |
| B LEG9  | WIRE      | ACTIVE   | 4270.                |      | JACK V | 4.00        | -96.00  | 37.00 | GROUND      | -2999.09 | -3099.08 |
| - LEG10 | CHAIN     | ACTIVE   | 1349.                |      | JACK V | .00         | -88.00  | 37.00 | GROUND      | -1281.00 | -88.00   |

\*\*\*\*\* CSCAR \*\*\*\*\*

## \*\*\*\*\* SEMISUBMERSIBLE MCORING \*\*\*\*\*

\*\*\*\*\* DATE 95/12/09 \*\*\*\*\*

## \*\*\*\*\* MCORING LINE PROPERTIES \*\*\*\*\*

| NAME  | LINE       | TYPE     | LENGTH OF<br>FEET | FIRST SEG. | BODY   | COORDINATES |       | CONNECTIONS |          | COORDINATES |         |
|-------|------------|----------|-------------------|------------|--------|-------------|-------|-------------|----------|-------------|---------|
|       |            |          |                   |            |        | X           | Y     | X           | Y        | X           | Y       |
| LEG1  | CHAIN      | ACTIVE   | 1349.             | JACKV      | .00    | 98.00       | 37.00 | GROUND      | -1280.97 | 88.00       | -350.00 |
| LEG2  | WIRE       | ACTIVE   | 4270.             | JACKV      | 4.00   | 96.00       | 37.00 | GROUND      | -2998.72 | 3098.72     | -350.00 |
| LEG3  | WIRE/CHAIN | ACTIVE   | 4790.             | JACKV      | 100.00 | 100.00      | 37.00 | GROUND      | 100.00   | 5408.09     | -350.00 |
| LEG4  | WIRE       | ACTIVE   | 4270.             | JACKV      | 196.00 | 96.00       | 37.00 | GROUND      | 3198.72  | 3098.72     | -350.00 |
| LEG5  | CHAIN      | ACTIVE   | 1349.             | JACKV      | 200.00 | 88.00       | 37.00 | GROUND      | 1480.97  | 88.00       | -350.00 |
| LEG6  | CHAIN      | REDEFINE | 1349.             | JACKV      | 200.00 | -88.00      | 37.00 | GROUND      | 1480.97  | -88.00      | -350.00 |
| LEG7  | WIRE       | REDEFINE | 4270.             | JACKV      | 196.00 | -96.00      | 37.00 | GROUND      | 3198.72  | -3098.72    | -350.00 |
| LEG8  | WIRE/CHAIN | REDEFINE | 4790.             | JACKV      | 100.00 | -100.00     | 37.00 | GROUND      | 100.00   | -5408.09    | -350.00 |
| LEG9  | WIRE       | REDEFINE | 4270.             | JACKV      | 4.00   | -96.00      | 37.00 | GROUND      | -2998.72 | -3098.72    | -350.00 |
| LEG10 | CHAIN      | REDEFINE | 1349.             | JACKV      | .00    | -88.00      | 37.00 | GROUND      | -1280.97 | -88.00      | -350.00 |

\*\*\* CSCAP \*\*\*  
\* SEMIIMMERSIBLE MUDPILG \*

DATE 85/12/09

## HULLRING RESULTS

### INITIAL CONFIGURATION

### LOCATION OF ADDED BODIES

| BODY  | LOCATION OF ORIGIN ( FEET ) |     |        | ROTATIONS (DEG.) |       |     |
|-------|-----------------------------|-----|--------|------------------|-------|-----|
|       | X                           | Y   | Z      | ROLL             | PITCH | YAW |
| JACKY | .00                         | .00 | -75.00 | .00              | .00   | .00 |

### STATUS OF LINES IN THIS CONFIGURATION

| ( FEET )   | ACTIVE LENGTH    |                |         | END ONE ( KIPS ) |                |         | END TWO ( KIPS ) |                |         |
|------------|------------------|----------------|---------|------------------|----------------|---------|------------------|----------------|---------|
|            | HORIZONTAL FORCE | VERTICAL FORCE | TENSION | HORIZONTAL FORCE | VERTICAL FORCE | TENSION | HORIZONTAL FORCE | VERTICAL FORCE | TENSION |
| LEG1 947.  | 100.             | 74.            | 125.    | 100.             | 0.             | 100.    | 100.             | 0.             | 100.    |
| LEG2 2098. | 100.             | 30.            | 105.    | 100.             | 100.           | 100.    | 100.             | 100.           | 100.    |
| LEG3 2096. | 100.             | 30.            | 105.    | 100.             | 100.           | 100.    | 100.             | 0.             | 100.    |
| LEG4 2098. | 100.             | 30.            | 105.    | 100.             | 100.           | 100.    | 100.             | 0.             | 100.    |
| LEG5 947.  | 100.             | 74.            | 125.    | 100.             | 100.           | 100.    | 100.             | 0.             | 100.    |
| LEG6 947.  | 100.             | 74.            | 125.    | 100.             | 100.           | 100.    | 100.             | 0.             | 100.    |
| LEG7 2098. | 100.             | 30.            | 105.    | 100.             | 100.           | 100.    | 100.             | 0.             | 100.    |
| LEG8 2096. | 100.             | 30.            | 105.    | 100.             | 100.           | 100.    | 100.             | 0.             | 100.    |
| LEG9 2098. | 100.             | 30.            | 105.    | 100.             | 100.           | 100.    | 100.             | 0.             | 100.    |
| LEG10 947. | 100.             | 74.            | 125.    | 100.             | 100.           | 100.    | 100.             | 0.             | 100.    |



\*\*\* OSCAR \*\*\*

DATE 85/12/09 \*

SEMI-SUBMERSIBLE MUDFLING

## DRIFT FORCE METHOD = FREQUENCY DOMAIN

SURGE DRIFT FACTOR = 1.000 SWAY DRIFT FACTOR = 1.000

F C R C E S C N B O D Y J A C K Y

| TYPE OF<br>FORCE | FORCES ( FEET ) |      |       | MOMENTS ( RIPS - FEET ) |         |     |
|------------------|-----------------|------|-------|-------------------------|---------|-----|
|                  | SURGE           | SWAY | HEAVE | ROLL                    | PITCH   | YAW |
| WIND             | -148.0          | .0   | .0    | .0.                     | -21751. | .0. |
| WAVE             | .0              | .0   | .0    | .0.                     | .0.     | .0. |
| CURRENT          | -33.7           | .0   | .0    | .0.                     | -1248.  | .0. |
| APPLIED          | .0              | .0   | .0    | .0.                     | .0.     | .0. |
| TOTAL            | -181.7          | .0   | .0    | .0.                     | -22999. | .0. |

## SEMISUBMERSIBLE MOORING

\*\*\* CSCAF \*\*\*

DATE 05/12/69

## MOORING RESULTS

## EQUILIBRIUM POSITION

## LOCATION OF MOORED BODIES

| BODY<br>NAME | LOCATION OF ORIGIN ( FEET ) |      | ROTATIONS ( DEG. ) |             |
|--------------|-----------------------------|------|--------------------|-------------|
|              | X---                        | Y--- | ROLL               | PITCH YAW   |
| JACKY        | -11.02                      | .00  | -75.00             | .00 .00 .00 |

## STATUS OF LINES IN THIS CONFIGURATION

| ACTIVE<br>LENGTH<br>( FEET ) | END ONE ( KIPS )    |                   |         | END TWO ( KIPS )    |                   |         |
|------------------------------|---------------------|-------------------|---------|---------------------|-------------------|---------|
|                              | HORIZONTAL<br>FORCE | VERTICAL<br>FORCE | TENSION | HORIZONTAL<br>FORCE | VERTICAL<br>FORCE | TENSION |
| LEG1                         | 825.                | 74.               | 98.     | 74.                 | 0.                | 74.     |
| LEG2                         | 1779.               | 71.               | 76.     | 71.                 | 0.                | 71.     |
| LEG3                         | 2C97.               | 100.              | 30.     | 105.                | 100.              | 100.    |
| LEG4                         | 2478.               | 141.              | 36.     | 146.                | 141.              | 0.      |
| LEG5                         | 1105.               | 141.              | 86.     | 165.                | 141.              | 0.      |
| LEG6                         | 1105.               | 141.              | 86.     | 165.                | 141.              | 0.      |
| LEG7                         | 2478.               | 141.              | 36.     | 146.                | 141.              | 0.      |
| LEG8                         | 2C97.               | 100.              | 30.     | 105.                | 100.              | 100.    |
| LEG9                         | 1779.               | 71.               | 26.     | 76.                 | 71.               | 0.      |
| LEG10                        | 825.                | 74.               | 65.     | 98.                 | 74.               | 74.     |

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SEMIIMMERSIBLE MOORING

DATE 8/12/09

MOORING RESULTS

EQUILIBRIUM POSITION + DIRECT WAVE MOTION

LOCATION OF MOORED BODIES

| BODY  | LOCATION OF ORIGIN ( FEET ) | ROTATIONS (DEG.) |       |     |
|-------|-----------------------------|------------------|-------|-----|
|       |                             | ROLL             | PITCH | YAW |
| JACKY | -11.02 .00 -75.00           | .00              | .00   | .00 |
| B     |                             |                  |       |     |

STATUS OF LINES IN THIS CONFIGURATION

| ACTIVE LENGTH<br>( FEET ) | END ONE ( KIPS ) |                | END TWO ( KIPS ) |                |
|---------------------------|------------------|----------------|------------------|----------------|
|                           | HORIZONTAL FORCE | VERTICAL FORCE | HORIZONTAL FORCE | VERTICAL FORCE |
| LEG1 829.                 | 74.              | 65.            | 74.              | 0.             |
| LEG2 1779.                | 71.              | 26.            | 71.              | 0.             |
| LEG3 2097.                | 100.             | 30.            | 105.             | 100.           |
| LEG4 2478.                | 141.             | 36.            | 146.             | 0.             |
| LEG5 1105.                | 141.             | 86.            | 165.             | 141.           |
| LEG6 1105.                | 141.             | 86.            | 165.             | 0.             |
| LEG7 2478.                | 141.             | 36.            | 146.             | 141.           |
| LEG8 2097.                | 100.             | 30.            | 105.             | 100.           |
| LEG9 1779.                | 71.              | 26.            | 76.              | 0.             |
| LEG10 829.                | 74.              | 65.            | 74.              | 0.             |

SEMISUBMERSIBLE DRILLING  
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CSCAR \*\*\*

DATE 85/12/09

REDEFINITION OF INITIAL CONFIGURATION  
\* \* \*

LOCATION OF MOORED BODIES

| BODY  | LOCATION OF ORIGIN ( FEET ) | ROTATIONS ( DEG. ) |       |      |
|-------|-----------------------------|--------------------|-------|------|
|       |                             | NAME               | X---  | Y--- |
|       |                             | ROLL               | PITCH | YAW  |
| JACKY | -11.02 .00 -75.00           | .00                | .00   | .00  |

STATUS OF LINES IN THIS CONFIGURATION

|       | ACTIVE LENGTH ( FEET ) | END ONE ( KIPS ) |                  | END TWO ( KIPS ) |                  |
|-------|------------------------|------------------|------------------|------------------|------------------|
|       |                        | HORIZONTAL FORCE | VERTICAL TENSION | HORIZONTAL FORCE | VERTICAL TENSION |
| LEG1  | 829.                   | 74.              | 62.              | 74.              | 0.               |
| LEG2  | 1779.                  | 71.              | 26.              | 71.              | 0.               |
| LEG3  | 2097.                  | 100.             | 30.              | 105.             | 100.             |
| LEG4  | 2478.                  | 141.             | 36.              | 146.             | 141.             |
| LEG5  | 1105.                  | 141.             | 86.              | 165.             | 141.             |
| LEG6  | 1105.                  | 141.             | 86.              | 165.             | 141.             |
| LEG7  | 2478.                  | 141.             | 36.              | 146.             | 141.             |
| LEG8  | 2097.                  | 100.             | 30.              | 105.             | 100.             |
| LEG9  | 1779.                  | 71.              | 26.              | 76.              | 71.              |
| LEG10 | 629.                   | 74.              | 65.              | 98.              | 74.              |

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## SEMISSUBMERSIBLE MODULING

DATE 05/12/09

## MOORING RESULTS

## INITIAL CONFIGURATION

## LOCATION OF MOORED BODIES

| NAME  | BODY | LOCATION OF ORIGIN ( FEET ) |     |        | ROTATIONS ( DEG. ) |       |     |
|-------|------|-----------------------------|-----|--------|--------------------|-------|-----|
|       |      | X                           | Y   | Z      | ROLL               | PITCH | YAW |
| JACKY |      | -11.02                      | .00 | -75.00 | .00                | .00   | .00 |

## STATUS OF LINES IN THIS CONFIGURATION

| ( FEET ) | ACTIVE LENGTH | END ONE ( KIPS ) |                |         | END TWO ( KIPS ) |                |         |
|----------|---------------|------------------|----------------|---------|------------------|----------------|---------|
|          |               | HORIZONTAL FORCE | VERTICAL FORCE | TENSION | HORIZONTAL FORCE | VERTICAL FORCE | TENSION |
| LEG1     | 826.          | 74.              | 65.            | 98.     | 74.              | 0.             | 74.     |
| LEG2     | 1779.         | 71.              | 26.            | 76.     | 71.              | 0.             | 71.     |
| LEG3     | 2971.         | 100.             | 30.            | 105.    | 100.             | 0.             | 100.    |
| LEG4     | 2478.         | 141.             | 36.            | 146.    | 141.             | 0.             | 141.    |
| LEG5     | 1105.         | 141.             | 86.            | 165.    | 141.             | 0.             | 141.    |
| LEG6     | 1105.         | 141.             | 86.            | 165.    | 141.             | 0.             | 141.    |
| LEG7     | 2478.         | 141.             | 36.            | 146.    | 141.             | 0.             | 141.    |
| LEG8     | 2971.         | 100.             | 30.            | 105.    | 100.             | 0.             | 100.    |
| LEG9     | 1779.         | 71.              | 26.            | 76.     | 71.              | 0.             | 71.     |
| LEG10    | 829.          | 74.              | 65.            | 98.     | 74.              | 0.             | 74.     |

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\*\*\* CSCAR \*\*\*

DATE 05/12/09

## SEMISUBMERSIBLE HOUSING

EQUILIBRIUM WILL BE FOUND WITH THE FOLLOWING

## ENVIRONMENTAL CONDITIONS

## WAVES

| SPECTRUM TYPE | SIGNIFICANT HEIGHT<br>FEET | MEAN PERIOD<br>(SEC.) | DIRECTION<br>(DEG.) |
|---------------|----------------------------|-----------------------|---------------------|
|               | 0.0                        | 0.00                  | 0.0                 |

## WIND

| SPEED<br>(KNOTS) | DIRECTION<br>(DEG.) |
|------------------|---------------------|
| 50.0             | 0.0                 |

## CURRENT

DIRECTION = 0. DEG.

| SPEED<br>( FEET / SEC) | DEPTH<br>FEET |
|------------------------|---------------|
| 1.65                   | 0             |
| 1.65                   | 350.0         |

| DRIFT FORCE METHOD - FREQUENCY DOMAIN |                          |
|---------------------------------------|--------------------------|
| SURGE DRIFT FORCE = 1.000             | SWAY DRIFT FORCE = 1.000 |
| SEISMICMENSIABLE MOORING              |                          |
| DATE 05/12/09                         |                          |
| OSCAR                                 |                          |

SEMISUBMERSIBLE MOORING

000 CSCAR 000

DATE 05/12/09

MOORING RESULTS

EQUILIBRIUM POSITION

LOCATION OF MOORED BOOMES

| BODY  | LOCATION OF ORIGIN ( FEET ) | ROTATIONS (DEG.) |      |      |      |      |       |     |
|-------|-----------------------------|------------------|------|------|------|------|-------|-----|
|       |                             | NAME             | X--- | Y--- | Z--- | ROLL | PITCH | YAW |
| JACKY | -10.96 .00                  | -77.20           | .00  | .00  | .00  | .00  | .00   | .00 |

STATUS OF LINES IN THIS CONFIGURATION

| ACTIVE<br>LENGTH<br>( FEET ) | HORIZONTAL<br>FORCE | END ONE ( KIPS )      |                     | END TWO ( KIPS )    |                   |
|------------------------------|---------------------|-----------------------|---------------------|---------------------|-------------------|
|                              |                     | HORIZONTAL<br>TENSION | VERTICAL<br>TENSION | HORIZONTAL<br>FORCE | VERTICAL<br>FORCE |
| LEG1                         | 030.                | 72.                   | 64.                 | 96.                 | 72.               |
| LEG2                         | 178C.               | 70.                   | 25.                 | 75.                 | 70.               |
| LEG3                         | 2097.               | 100.                  | 30.                 | 104.                | 100.              |
| LEG4                         | 2475.               | 140.                  | 36.                 | 144.                | 140.              |
| LEG5                         | 1104.               | 139.                  | 86.                 | 164.                | 139.              |
| LEG6                         | 1104.               | 139.                  | 86.                 | 164.                | 139.              |
| LEG7                         | 2475.               | 140.                  | 36.                 | 144.                | 139.              |
| LEG8                         | 2C97.               | 100.                  | 30.                 | 104.                | 140.              |
| LEG9                         | 178C.               | 70.                   | 25.                 | 75.                 | 70.               |
| LEG10                        | £30.                | 72.                   | 64.                 | 96.                 | 72.               |

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DATE 05/12/09

## SEMISUBMERSIBLE MOORING

## MOORING RESULTS

## EQUILIBRIUM POSITION + DIRECT WAVE MOTION

## LOCATION OF MOORED BODIES

## BODY LOCATION OF ORIGIN ( FEET )

| NAME  | X---   | Y--- | Z---   | ROLL | PITCH | YAW |
|-------|--------|------|--------|------|-------|-----|
| JACKY | -10.96 | .00  | -77.20 | .00  | .00   | .00 |

## STATUS OF LINES IN THIS CONFIGURATION

| ACTIVE LENGTH<br>( FEET ) | END ONE ( KIPS ) |                | END TWO ( KIPS )   |                  |
|---------------------------|------------------|----------------|--------------------|------------------|
|                           | HORIZONTAL FORCE | VERTICAL FORCE | HORIZONTAL TENSION | VERTICAL TENSION |
| LEG1 830.                 | 72.              | 64.            | 72.                | 0.               |
| LEG2 1780.                | 70.              | 25.            | 70.                | 0.               |
| LEG3 2097.                | 100.             | 30.            | 104.               | 100.             |
| LEG4 2475.                | 140.             | 36.            | 146.               | 140.             |
| LEG5 1104.                | 139.             | 86.            | 166.               | 139.             |
| LEG6 1104.                | 139.             | 86.            | 164.               | 139.             |
| LEG7 2475.                | 140.             | 36.            | 146.               | 140.             |
| LEG8 2097.                | 100.             | 30.            | 104.               | 100.             |
| LEG9 1780.                | 70.              | 25.            | 75.                | 0.               |
| LEG10 830.                | 72.              | 64.            | 96.                | 72.              |

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\*\*\*\*\* SEMISUBMERSIBLE MOORING \*\*\*\*\*

\*\*\*\*\* DATE 85/12/00 \*\*\*\*\*

**REDEFINITION OF INITIAL CONFIGURATION**

**LOCATION OF MOORED BODIES**

| BODY<br>NAME | LOCATION OF ORIGIN ( FEET )<br>---X---<br>---Y--- | ROTATIONS ( DEG. ) |       |     |
|--------------|---|--------------------|-------|-----|
|              |   | ROLL               | PITCH | YAW |
| JACKY        | -10.96 .00 -77.20                                 | .00                | .00   | .00 |

**STATUS OF LINES IN THIS CONFIGURATION**

| ACTIVE<br>LENGTH<br>( FEET ) | END ONE ( KIPS )    |                     | END TWO ( KIPS )    |                     |
|------------------------------|---------------------|---------------------|---------------------|---------------------|
|                              | HORIZONTAL<br>FORCE | VERTICAL<br>TENSION | HORIZONTAL<br>FORCE | VERTICAL<br>TENSION |
| LEG1 830.                    | 72.                 | 64.                 | 96.                 | 72.                 |
| LEG2 1780.                   | 70.                 | 25.                 | 75.                 | 70.                 |
| LEG3 2C97.                   | 100.                | 30.                 | 104.                | 100.                |
| LEG4 2475.                   | 140.                | 36.                 | 144.                | 140.                |
| LEG5 1104.                   | 139.                | 86.                 | 164.                | 139.                |
| LEG6 1104.                   | 139.                | 86.                 | 164.                | 139.                |
| LEG7 2475.                   | 140.                | 36.                 | 144.                | 140.                |
| LEG8 2C97.                   | 100.                | 30.                 | 104.                | 100.                |
| LEG9 1780.                   | 70.                 | 25.                 | 75.                 | 70.                 |
| LEG10 830.                   | 72.                 | 64.                 | 96.                 | 72.                 |

PAGE 46

\*\*\* ESCAR \*\*\*

DATE 85/12/09

SEISMICALLY MOORING

## MOORING RESULTS

### INITIAL CONFIGURATION

#### LOCATION OF MOORED BODIES

| BODY  | LOCATION OF ORIGIN ( FEET ) |     |        | ROTATIONS ( DEG. ) |       |     |
|-------|-----------------------------|-----|--------|--------------------|-------|-----|
|       | X                           | Y   | Z      | ROLL               | PITCH | YAW |
| JACKY | -10.96                      | .00 | -77.20 | .00                | .00   | .00 |

#### STATUS OF LINES IN THIS CONFIGURATION

| ACTIVE<br>LENGTH<br>( FEET ) | END ONE ( KIPS )    |                     |                     | END TWO ( KIPS )    |                     |                     |
|------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                              | HORIZONTAL<br>FORCE | VERTICAL<br>TENSION | HORIZONTAL<br>FORCE | VERTICAL<br>TENSION | HORIZONTAL<br>FORCE | VERTICAL<br>TENSION |
| LEG1 830.                    | 72.                 | 64.                 | 96.                 | 72.                 | 0.                  | 72.                 |
| LEG2 1780.                   | 70.                 | 25.                 | 72.                 | 70.                 | 0.                  | 70.                 |
| LEG3 2097.                   | 100.                | 30.                 | 104.                | 100.                | 0.                  | 100.                |
| LEG4 2475.                   | 140.                | 36.                 | 144.                | 140.                | 0.                  | 140.                |
| LEG5 1104.                   | 139.                | 66.                 | 164.                | 139.                | 0.                  | 139.                |
| LEG6 1104.                   | 139.                | 86.                 | 164.                | 139.                | 0.                  | 139.                |
| LEG7 2475.                   | 146.                | 36.                 | 144.                | 140.                | 0.                  | 140.                |
| LEG8 2097.                   | 100.                | 30.                 | 104.                | 100.                | 0.                  | 100.                |
| LEG9 1786.                   | 70.                 | 25.                 | 75.                 | 70.                 | 0.                  | 70.                 |
| LEG10 830.                   | 72.                 | 64.                 | 96.                 | 72.                 | 0.                  | 72.                 |

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 \* ESCAR \*\*\*  
 \* DATE 85/12/09  
 \* SEMISUBMERSIBLE MOORING  
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EQUILIBRIUM WILL BE FOUND WITH THE FOLLOWING

ENVIRONMENTAL CONDITIONS

WAVES

| SPECTRUM TYPE | SIGNIFICANT HEIGHT<br>FEET | MEAN PERIOD<br>(SEC.) | DIRECTION<br>(DEG.) |
|---------------|----------------------------|-----------------------|---------------------|
| C             | .00                        | .00                   |                     |

R - 47

| SPEED<br>(KNOTS) | DIRECTION<br>(DEG.) |
|------------------|---------------------|
| 50.0             | .0                  |

WIND

CURRENT

DIRECTION = 0. DEG.

| SPEED<br>(FEET / SEC) | DEPTH<br>FEET |
|-----------------------|---------------|
| 1.66                  | 0.0           |
| 1.66                  | 350.0         |

\*\*\*\*\* QQQ OSCAR QQQ \*\*\*\*\*

SEMI-SUBMERSIBLE MUDFLAG

\*\*\*\*\* DATE 85/12/00 \*\*\*\*\*

## DRIFT FORCE METHOD - FREQUENCY DOMAIN

SURGE DRIFT FACTOR = 1.000 SWAY DRIFT FACTOR = 1.000

FORCES G N BOODY JACKY

| TYPE OF<br>FORCE | FORCES ( FEET ) |      | MOMENTS ( FEETS - FEET ) |      |         |
|------------------|-----------------|------|--------------------------|------|---------|
|                  | SURGE           | SWAY | HEAVE                    | ROLL | PITCH   |
| WIND             | -147.9          | .0   | .0                       | 0.   | -21748. |
| WAVE             | .0              | .0   | .0                       | 0.   | 0.      |
| CURRENT          | -33.7           | .0   | .0                       | 0.   | -1248.  |
| APPLIED          | .0              | .0   | .0                       | 0.   | 0.      |
| TOTAL            | -181.7          | .0   | .0                       | 0.   | -22996. |

SEMI-SUBMERSIBLE HOOPING

DATE 05/12/09

OSCAR

## HOOPING RESULTS

## EQUILIBRIUM POSITION

## LOCATION OF MOORED HOOPES

## LOCATION OF ORIGIN ( FEET ) ROTATIONS ( DEG. )

| NAME  | ROLL  | PITCH | YAW    |
|-------|-------|-------|--------|
| JACKY | -9.67 | 0.00  | -79.09 |

## STATUS OF LINES IN THIS CONFIGURATION

## END ONE ( KIPS )

| BODY<br>( FEET ) | ACTIVE<br>LENGTH | HORIZONTAL<br>FORCE | VERTICAL<br>FORCE | TENSION | HORIZONTAL<br>FORCE | VERTICAL<br>FORCE | TENSION |
|------------------|------------------|---------------------|-------------------|---------|---------------------|-------------------|---------|
| LEG1 838.        | 72.              | 63.                 | 96.               | 72.     | 0.                  | 72.               | 0.      |
| LEG2 1802.       | 71.              | 25.                 | 75.               | 71.     | 0.                  | 71.               | 0.      |
| LEG3 2007.       | 100.             | 30.                 | 104.              | 100.    | 0.                  | 100.              | 0.      |
| LEG4 2497.       | 137.             | 35.                 | 142.              | 137.    | 0.                  | 137.              | 0.      |
| LEG5 1091.       | 137.             | 65.                 | 161.              | 137.    | 0.                  | 137.              | 0.      |
| LEG6 1091.       | 137.             | 65.                 | 161.              | 137.    | 0.                  | 137.              | 0.      |
| LEG7 247.        | 137.             | 35.                 | 142.              | 137.    | 0.                  | 137.              | 0.      |
| LEG8 2097.       | 100.             | 30.                 | 104.              | 100.    | 0.                  | 100.              | 0.      |
| LEG9 1802.       | 71.              | 25.                 | 75.               | 71.     | 0.                  | 71.               | 0.      |
| LEG10 838.       | 72.              | 63.                 | 96.               | 72.     | 0.                  | 72.               | 0.      |

SEMI-SUBMERSIBLE MOORING  
ESCAP

DATE 05/12/09

## MOORING RESULTS

## EQUILIBRIUM POSITION + DIRECT WAVE MOTION

## LOCATION OF MOORED BODIES

| NAME  | BODY | LOCATION OF ORIGIN ( FEET ) |     |        | ROTATIONS ( DEG. ) |       |     |
|-------|------|-----------------------------|-----|--------|--------------------|-------|-----|
|       |      | X                           | Y   | Z      | ROLL               | PITCH | YAW |
| JACKY |      | -9.41                       | .00 | -79.09 | .00                | -1.04 | .00 |

## STATUS OF LINES IN THIS CONFIGURATION

| ACTIVE LENGTH<br>( FEET ) | END ONE ( KIPS ) |                |         | END TWO ( KIPS ) |                |         |
|---------------------------|------------------|----------------|---------|------------------|----------------|---------|
|                           | HORIZONTAL FORCE | VERTICAL FORCE | TENSION | HORIZONTAL FORCE | VERTICAL FORCE | TENSION |
| LEG1 138.                 | 72.              | 63.            | 96.     | 72.              | 0.             | 72.     |
| LEG2 1802.                | 71.              | 25.            | 75.     | 71.              | 0.             | 71.     |
| LEG3 2097.                | 100.             | 30.            | 104.    | 100.             | 0.             | 100.    |
| LEG4 2447.                | 137.             | 35.            | 142.    | 137.             | 0.             | 137.    |
| LEG5 1091.                | 137.             | 85.            | 161.    | 137.             | 0.             | 137.    |
| LEG6 1091.                | 137.             | 85.            | 161.    | 137.             | 0.             | 137.    |
| LEG7 2447.                | 137.             | 35.            | 142.    | 137.             | 0.             | 137.    |
| LEG8 2097.                | 100.             | 30.            | 104.    | 100.             | 0.             | 100.    |
| LEG9 1802.                | 71.              | 25.            | 75.     | 71.              | 0.             | 71.     |
| LEG10 138.                | 72.              | 63.            | 96.     | 72.              | 0.             | 72.     |

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 SEMISUBMERSIBLE MOORING

DATE 05/12/00

## REDEFINITION OF INITIAL CONFIGURATION

## LOCATION OF HOODED WOOGIES

| NAME  | BODY | LOCATION OF ORIGIN ( FEET ) |      |        | ROTATIONS ( DEG. ) |       |     |
|-------|------|-----------------------------|------|--------|--------------------|-------|-----|
|       |      | X---                        | Y--- | Z---   | ROLL               | PITCH | YAW |
| JACKY |      | -9.47                       | .00  | -79.09 | .00                | -1.04 | .00 |

## STATUS OF LINES IN THIS CONFIGURATION

| ACTIVE LENGTH ( FEET ) | END ONE ( KIPS ) |                |         | END TWO ( KIPS ) |                |         |
|------------------------|------------------|----------------|---------|------------------|----------------|---------|
|                        | HORIZONTAL FORCE | VERTICAL FORCE | TENSION | HORIZONTAL FORCE | VERTICAL FORCE | TENSION |
| LEG1 838.              | 72.              | 63.            | 96.     | 72.              | 0.             | 72.     |
| LEG2 1862.             | 71.              | 25.            | 75.     | 71.              | 0.             | 71.     |
| LEG3 2097.             | 100.             | 30.            | 104.    | 100.             | 0.             | 100.    |
| LEG4 2447.             | 137.             | 35.            | 142.    | 137.             | 0.             | 137.    |
| LEG5 1091.             | 137.             | 85.            | 161.    | 137.             | 0.             | 137.    |
| LEG6 1091.             | 137.             | 85.            | 161.    | 137.             | 0.             | 137.    |
| LEG7 2447.             | 137.             | 35.            | 142.    | 137.             | 0.             | 137.    |
| LEG8 2C97.             | 100.             | 30.            | 104.    | 100.             | 0.             | 100.    |
| LEG9 1602.             | 71.              | 25.            | 75.     | 71.              | 0.             | 71.     |
| LEG10 1360.            | 72.              | 63.            | 96.     | 72.              | 0.             | 72.     |

OSCAR \*\*\*

SEMI-SUBMERSIBLE MOORING

DATE 05/12/09

## MOORING LINE PROPERTIES OF LINE LEG1

LINE TYPE = CHAIN

WATER DEPTH = 350. LENGTH OF FIRST SEGMENT = 1349.

## FORCE-DISTANCE PROPERTIES ( FEET KIPS )

| DISTANCE | HORIZONTAL<br>FORCE | TENSION | DRAFT | VERTICAL HORIZONTAL |                   | LINE ON<br>BOTTOM | HEIGHT OF<br>1ST CONN.<br>ABOVE<br>ANCHOR | NET FORCE<br>APPLIED<br>AT<br>1ST CONN. |
|----------|---------------------|---------|-------|---------------------|-------------------|-------------------|---|---|
|          |                     |         |       | PULL ON<br>ANCHOR   | PULL ON<br>ANCHOR |                   |   |   |
| 1041.10  | .00                 | 24.02   | .07   | .00                 | .00               | 1041.10           | .00                                       | .00                                     |
| 1226.91  | 26.67               | 50.67   | .49   | .00                 | 26.67             | 796.86            | .00                                       | .00                                     |
| 1258.53  | 53.33               | 77.33   | 1.27  | .00                 | 53.33             | 631.55            | .00                                       | .00                                     |
| 1274.33  | 80.00               | 103.99  | 2.18  | .00                 | 80.00             | 497.81            | .00                                       | .00                                     |
| 1284.33  | 106.67              | 130.65  | 3.20  | .00                 | 106.67            | 382.36            | .00                                       | .00                                     |
| 1291.47  | 133.33              | 157.31  | 4.30  | .00                 | 133.33            | 279.31            | .00                                       | .00                                     |
| 1296.96  | 160.00              | 183.96  | 5.46  | .00                 | 160.00            | 195.42            | .00                                       | .00                                     |
| 1301.36  | 186.67              | 210.62  | 6.67  | .00                 | 186.67            | 98.48             | .00                                       | .00                                     |
| 1305.02  | 213.33              | 237.28  | 8.07  | .00                 | 213.33            | 17.20             | .00                                       | .00                                     |
| 1308.03  | 240.00              | 263.99  | 10.17 | .473                | 240.00            | .00               | .00                                       | .00                                     |
| 1310.35  | 266.67              | 290.82  | 12.96 | .10.81              | 266.67            | .00               | .00                                       | .00                                     |
| 1312.20  | 293.33              | 317.74  | 15.93 | .16.91              | 292.33            | .00               | .00                                       | .00                                     |
| 1313.73  | 320.00              | 344.74  | 18.91 | .23.02              | 320.00            | .00               | .00                                       | .00                                     |
| 1315.04  | 346.67              | 371.79  | 22.00 | .29.14              | 346.67            | .00               | .00                                       | .00                                     |
| 1316.17  | 373.33              | 398.89  | 24.92 | .35.27              | 373.33            | .00               | .00                                       | .00                                     |
| 1317.19  | 400.00              | 426.03  | 27.60 | .41.40              | 400.00            | .00               | .00                                       | .00                                     |
| 1318.11  | 426.67              | 453.19  | 30.36 | .47.53              | 426.67            | .00               | .00                                       | .00                                     |
| 1318.95  | 453.33              | 480.37  | 32.66 | .53.67              | 453.33            | .00               | .00                                       | .00                                     |
| 1319.74  | 480.00              | 507.57  | 34.96 | .59.79              | 480.00            | .00               | .00                                       | .00                                     |
| 1320.47  | 506.67              | 534.80  | 36.98 | .65.94              | 506.67            | .00               | .00                                       | .00                                     |
| 1321.18  | 533.33              | 562.03  | 38.48 | .72.07              | 533.33            | .00               | .00                                       | .00                                     |
| 1321.86  | 560.00              | 589.27  | 39.97 | .78.20              | 560.00            | .00               | .00                                       | .00                                     |
| 1322.52  | 586.67              | 616.52  | 41.39 | .84.31              | 586.67            | .00               | .00                                       | .00                                     |
| 1323.15  | 613.33              | 643.79  | 42.65 | .90.44              | 613.33            | .00               | .00                                       | .00                                     |
| 1323.76  | 640.00              | 671.06  | 43.99 | .96.57              | 640.00            | .00               | .00                                       | .00                                     |
| 1324.36  | 666.67              | 698.33  | 45.10 | .102.68             | 666.67            | .00               | .00                                       | .00                                     |
| 1324.94  | 693.33              | 725.62  | 45.90 | .108.81             | 693.33            | .00               | .00                                       | .00                                     |
| 1325.52  | 720.00              | 752.90  | 46.53 | .114.91             | 720.00            | .00               | .00                                       | .00                                     |
| 1326.09  | 746.67              | 780.19  | 47.57 | .121.03             | 746.67            | .00               | .00                                       | .00                                     |
| 1326.65  | 773.33              | 807.49  | 47.65 | .127.14             | 773.33            | .00               | .00                                       | .00                                     |

OSCAR 669

## SEMIUBMERSIBLE MUDRING

DATE 6/12/76

## MOORING LINE PROPERTIES OF LINE LF62

LINE TYPE = WIRE      WATER DEPTH = 350.      LENGTH OF FIRST SEGMENT = 4270.

FORCE-DISTANCE PROPERTIES ( FEET KIPS )

| DISTANCE | HORIZONTAL<br>FORCE | TENSION | B/H/DX | VERTICAL<br>PULL ON<br>ANCHOR | HORIZONTAL<br>PULL ON<br>ANCHOR | LINE IN<br>BOTTOM | HEIGHT OF<br>NET FORCE<br>AT<br>ANCHOR | 1ST CONN.<br>1ST CONN. |
|----------|---------------------|---------|--------|-------------------------------|---------------------------------|-------------------|--|------------------------|
|          |                     |         | ANCHOR | ABOVE<br>ANCHOR               | ANCHOR                          | ANCHOR            | ANCHOR                                 | ANCHOR                 |
| 3962.02  | .00                 | 4.46    |        | .05                           | .00                             | .00               | 3962.02                                | .00                    |
| 4214.06  | 26.67               | 31.12   |        | .76                           | .00                             | 26.67             | 3163.63                                | .00                    |
| 4232.52  | 53.33               | 57.79   | 2.13   |                               | .60                             | 53.33             | 2735.84                                | .00                    |
| 4241.97  | 80.00               | 84.45   | 3.47   |                               | .00                             | 80.00             | 2404.37                                | .00                    |
| 4248.44  | 106.67              | 111.12  | 4.70   |                               | .00                             | 106.67            | 2123.72                                | .00                    |
| 4253.50  | 133.33              | 137.78  | 5.77   |                               | .00                             | 133.33            | 1875.77                                | .00                    |
| 4257.75  | 160.00              | 164.45  | 6.69   |                               | .00                             | 160.00            | 1651.36                                | .00                    |
| 4261.50  | 186.67              | 191.11  | 7.47   |                               | .00                             | 186.67            | 1444.69                                | .00                    |
| 4264.91  | 213.33              | 217.78  | 8.14   |                               | .00                             | 213.33            | 1252.16                                | .00                    |
| 4268.67  | 240.00              | 244.44  | 8.70   |                               | .00                             | 240.00            | 1071.10                                | .00                    |
| 4271.05  | 266.67              | 271.11  | 9.17   |                               | .00                             | 266.67            | 899.83                                 | .00                    |
| 4273.68  | 293.33              | 297.77  | 9.58   |                               | .00                             | 293.33            | 736.92                                 | .00                    |
| 4276.61  | 320.00              | 324.43  | 9.94   |                               | .00                             | 320.00            | 581.15                                 | .00                    |
| 4279.25  | 346.67              | 351.10  | 10.25  |                               | .00                             | 346.67            | 431.56                                 | .00                    |
| 4291.82  | 373.33              | 377.76  | 10.51  |                               | .00                             | 373.33            | 287.68                                 | .00                    |
| 4284.32  | 400.00              | 404.43  | 10.75  |                               | .00                             | 400.00            | 149.02                                 | .00                    |
| 4296.78  | 426.67              | 431.09  | 11.00  |                               | .00                             | 426.67            | 14.62                                  | .00                    |
| 4289.17  | 453.33              | 457.76  | 11.29  |                               | 1.69                            | 453.33            |  | .00                    |
| 4291.50  | 480.00              | 484.44  | 11.60  |                               | 3.56                            | 480.00            |  | .00                    |
| 4293.77  | 506.67              | 511.12  | 11.84  |                               | 5.47                            | 506.67            |  | .00                    |
| 4296.01  | 533.33              | 537.80  | 12.05  |                               | 7.36                            | 533.33            |  | .00                    |
| 4298.20  | 560.00              | 564.49  | 12.24  |                               | 9.25                            | 560.00            |  | .00                    |
| 4300.36  | 586.67              | 591.19  | 12.38  |                               | 11.14                           | 586.67            |  | .00                    |
| 4302.50  | 613.33              | 617.88  | 12.51  |                               | 12.63                           | 613.33            |  | .00                    |
| 4304.63  | 640.00              | 644.58  | 12.62  |                               | 14.91                           | 640.00            |  | .00                    |
| 4306.73  | 666.67              | 671.29  | 12.73  |                               | 16.79                           | 666.67            |  | .00                    |
| 4308.82  | 693.33              | 697.99  | 12.81  |                               | 18.67                           | 693.33            |  | .00                    |
| 4310.89  | 720.00              | 724.70  | 12.88  |                               | 20.55                           | 720.00            |  | .00                    |
| 4312.96  | 746.67              | 751.41  | 12.94  |                               | 22.43                           | 746.67            |  | .00                    |
| 4315.02  | 773.33              | 778.12  | 12.97  |                               | 24.31                           | 773.33            |  | .00                    |

OSCAR \*\*\*

## SEMISUBMERSIBLE MOORING

DATE 05/12/00

## MOORING LINE PROPERTIES ( FEET - RIPS )

LINE TYPE • WIRECHAT WATER DEPTF = 350. LENGTH OF FIRST SEGMENT = 4790.

## FORCE-DISTANCE PROPERTIES ( FEET - RIPS )

| DISTANCE | HORIZONTAL<br>FORCE | TENSION | VERTICAL          |                   | LINE ON<br>ANCHOR | PULL ON<br>ANCHOR | LINE ON<br>ANCHOR | NET FORCE<br>AT<br>ANCHOR |
|----------|---------------------|---------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------------------|
|          |                     |         | PULL ON<br>ANCHOR | PULL ON<br>ANCHOR |                   |                   |                   |                           |
| 502C.28  | .00                 | 4.48    | .05               | .00               | .00               | .00               | .00               | .00                       |
| 5274.01  | 26.67               | 31.15   | .75               | .00               | 26.67             | 4220.12           | .00               | .00                       |
| 5293.03  | 53.33               | 57.81   | 2.04              | .00               | 53.33             | 3792.28           | .00               | .00                       |
| 5302.96  | 80.00               | 96.48   | 3.26              | .00               | 80.00             | 3460.16           | .00               | .00                       |
| 5309.89  | 106.67              | 111.14  | 4.34              | .00               | 106.67            | 3179.23           | .00               | .00                       |
| 5315.40  | 133.33              | 137.81  | 5.26              | .00               | 133.33            | 2930.04           | .00               | .00                       |
| 5320.10  | 160.00              | 164.47  | 6.02              | .00               | 160.00            | 2706.26           | .00               | .00                       |
| 5324.29  | 186.67              | 191.14  | 6.65              | .00               | 186.67            | 2499.51           | .00               | .00                       |
| 5328.13  | 213.33              | 217.80  | 7.18              | .00               | 213.33            | 2306.82           | .00               | .00                       |
| 5331.73  | 240.00              | 244.47  | 7.61              | .00               | 240.00            | 2125.77           | .00               | .00                       |
| 5335.14  | 266.67              | 271.13  | 7.98              | .00               | 266.67            | 1954.43           | .00               | .00                       |
| 5338.41  | 293.33              | 297.80  | 8.29              | .00               | 293.33            | 1791.46           | .00               | .00                       |
| 5341.57  | 320.00              | 324.46  | 8.56              | .00               | 320.00            | 1635.77           | .00               | .00                       |
| 5344.64  | 346.67              | 351.12  | 8.79              | .00               | 346.67            | 1486.25           | .00               | .00                       |
| 5347.64  | 373.33              | 377.79  | 8.99              | .00               | 373.33            | 1342.38           | .00               | .00                       |
| 5350.58  | 400.00              | 404.45  | 9.17              | .00               | 400.00            | 1203.61           | .00               | .00                       |
| 5353.46  | 426.67              | 431.12  | 9.32              | .00               | 426.67            | 1069.12           | .00               | .00                       |
| 5356.30  | 453.33              | 457.78  | 9.45              | .00               | 453.33            | 938.92            | .00               | .00                       |
| 5359.10  | 480.00              | 484.45  | 9.57              | .00               | 480.00            | 812.45            | .00               | .00                       |
| 5361.67  | 506.67              | 511.11  | 9.68              | .00               | 506.67            | 689.18            | .00               | .00                       |
| 5364.61  | 533.33              | 537.78  | 9.78              | .00               | 533.33            | 569.39            | .00               | .00                       |
| 5367.32  | 560.00              | 564.44  | 9.81              | .00               | 560.00            | 526.85            | .02               | .00                       |
| 5369.99  | 586.67              | 591.11  | 10.04             | .00               | 586.67            | 505.31            | .10               | .00                       |
| 5372.63  | 613.33              | 617.79  | 10.15             | .00               | 613.33            | 483.82            | .23               | .00                       |
| 5375.25  | 640.00              | 644.46  | 10.23             | .00               | 640.00            | 462.52            | .41               | .00                       |
| 5377.85  | 666.67              | 671.14  | 10.32             | .00               | 666.67            | 441.33            | .62               | .00                       |
| 5380.42  | 693.33              | 697.82  | 10.40             | .00               | 693.33            | 420.14            | .87               | .00                       |
| 5382.98  | 720.00              | 724.50  | 10.45             | .00               | 720.00            | 399.06            | 1.14              | .00                       |
| 5385.52  | 746.67              | 751.16  | 10.50             | .00               | 746.67            | 378.16            | 1.44              | .00                       |
| 5388.05  | 773.33              | 777.67  | 10.54             | .00               | 773.33            | 357.25            | 1.77              | .00                       |

SEMI SUBMERSIBLE MOORING

OSCAR 99

DATE 85/12/09

## MOORING RESULTS

## INITIAL CONFIGURATION

## LOCATION OF MOORED BODIES

| NAME  | BODY | LOCATION OF ORIGIN ( FEET ) |     |        | ROTATIONS ( DEG. ) |       |     |
|-------|------|-----------------------------|-----|--------|--------------------|-------|-----|
|       |      | X                           | Y   | Z      | ROLL               | PITCH | YAW |
| JACKY |      | -9.47                       | .00 | -79.09 | .00                | -1.04 | .00 |

## STATUS OF LINES IN THIS CONFIGURATION

| ACTIVE LENGTH<br>( FEET ) | END ONE ( KIPS ) |                |         | END TWO ( KIPS ) |                |         |
|---------------------------|------------------|----------------|---------|------------------|----------------|---------|
|                           | HORIZONTAL FORCE | VERTICAL FORCE | TENSION | HORIZONTAL FORCE | VERTICAL FORCE | TENSION |
| LEG1 817.                 | 73.              | 64.            | 97.     | 73.              | 0.             | 73.     |
| LEG2 1764.                | 71.              | 26.            | 76.     | 71.              | 0.             | 71.     |
| LEG3 2074.                | 99.              | 30.            | 104.    | 99.              | 0.             | 99.     |
| LEG4 2447.                | 137.             | 35.            | 142.    | 137.             | 0.             | 137.    |
| LEG5 1091.                | 137.             | 85.            | 161.    | 137.             | 0.             | 137.    |
| LEG6 1091.                | 137.             | 85.            | 161.    | 137.             | 0.             | 137.    |
| LEG7 2447.                | 137.             | 35.            | 142.    | 137.             | 0.             | 137.    |
| LEG8 2097.                | 100.             | 30.            | 104.    | 100.             | 0.             | 100.    |
| LEG9 1802.                | 71.              | 25.            | 75.     | 71.              | 0.             | 71.     |
| LEG10 638.                | 72.              | 63.            | 96.     | 72.              | 0.             | 72.     |

SEMIUPHENSIBLE MORNING

OSCAR

DATE 05/12/09

## ENVIRONMENTAL CONDITIONS

FOUILLEROT WILL BE FOUND WITH THE FOLLOWING

## WAVES

| SPECTRUM TYPE | SIGNIFICANT HEIGHT<br>FEET<br>(SEC.) | MEAN PERIOD<br>DEG. | DIRECTION<br>(DEG.) |
|---------------|--------------------------------------|---------------------|---------------------|
| ISSC          | 12.00                                | .00                 | 50.0<br>0.0         |

ISSC .00 12.00

## WIND

| SPEED<br>(FEET/SEC) | DIRECTION<br>(DEG.) | DEPTH<br>FEET |
|---------------------|---------------------|---------------|
| 1.65                | 0.0                 | 350.0         |
| 1.65                | 0.0                 | 350.0         |

## WIND

----

## CURRENT

DIRECTION = 0.0 DEG.

| SPEED<br>(FEET/SEC) | DEPTH<br>FEET |
|---------------------|---------------|
| 0.0                 | 0.0           |

SEMI-SUBMERSIBLE MOORING

OSCAR \*\*\*

DATE 05/12/09

DRIFT FORCE METHOD - FREQUENCY DOMAIN

SURGE DRIFT FACTOR = 1.000 SWAY DRIFT FACTOR = 1.000

FORCES ON BODY JACKY

| TYPE OF<br>FORCE | FORCES (TEET) |      |       | MOMENTS (TRIPS - FEET) |         |     |
|------------------|---------------|------|-------|------------------------|---------|-----|
|                  | SURGE         | SWAY | HEAVE | ROLL                   | PITCH   | YAW |
| WIND             | -117.9        | 0.   | 0.    | 0.                     | -21746. | 0.  |
| CURRENT          | -33.7         | 0.   | 0.    | 0.                     | -1246.  | 0.  |
| WAVE             | 0.            | 0.   | 0.    | 0.                     | 0.      | 0.  |
| AAPPLIED         |               |      |       |                        |         |     |
| TOTAL            |               |      |       |                        | -161.7  | 0.  |

SEMISSUBMERSIBLE DRILLING  
OSCAR 800

DATE 05/12/79

## MOORING RESULTS

## EQUILIBRIUM POSITION

## LOCATION OF MOORED BODIES

| NAME  | BODY | LOCATION OF ORIGIN ( FEET ) |     |        | ROTATIONS ( DEG. ) |       |     |
|-------|------|-----------------------------|-----|--------|--------------------|-------|-----|
|       |      | X                           | Y   | Z      | ROLL               | PITCH | YAW |
| JACKY |      | -9.47                       | .00 | -79.09 | .00                | -1.04 | .00 |

## STATUS OF LINES IN THIS CONFIGURATION

|       | ACTIVE LENGTH ( FEET ) | END ONE ( KIPS ) |                |         | END TWO ( KIPS ) |                |         |
|-------|------------------------|------------------|----------------|---------|------------------|----------------|---------|
|       |                        | HORIZONTAL FORCE | VERTICAL FORCE | TENSION | HORIZONTAL FORCE | VERTICAL FORCE | TENSION |
| LEG1  | 917.                   | 73.              | 64.            | 97.     | 73.              | 0.             | 73.     |
| LEG2  | 1764.                  | 71.              | 26.            | 76.     | 71.              | 0.             | 71.     |
| LEG3  | 2674.                  | 99.              | 30.            | 104.    | 99.              | 0.             | 99.     |
| LEG4  | 2447.                  | 137.             | 35.            | 142.    | 137.             | 0.             | 137.    |
| LEGS  | 1091.                  | 137.             | 65.            | 161.    | 137.             | 0.             | 137.    |
| LEGG  | 1091.                  | 137.             | 65.            | 161.    | 137.             | 0.             | 137.    |
| LEG7  | 2447.                  | 137.             | 35.            | 142.    | 137.             | 0.             | 137.    |
| LEG8  | 2097.                  | 100.             | 30.            | 104.    | 100.             | 0.             | 100.    |
| LEG9  | 1802.                  | 71.              | 25.            | 75.     | 71.              | 0.             | 71.     |
| LEG10 | 838.                   | 72.              | 63.            | 96.     | 72.              | 0.             | 72.     |

**SEMI-SUBMERSIBLE MOORING**

DRAFT = 75.0 FEET      TRIM ANGLE = .00 DEG.  
 HEADING = .00 DEG.      FORWARD SPEED = .00 KNOTS  
 ROLL CY. RADIUS = 75.00 FEET      PITCH CY. RADIUS = 75.0 FEET  
 VAVE STEEPNESS = 1/20      VAVE CY. RADIUS = 75.0 FEET

600 USCAR 600

DATE 05/12/09

**VE SSEL RESPONSE OPERATORS**

**OF EDDY JACKY**

| ENCOUNTER |        | SURGE      | SWAY       | HEAVE      | ROLL       | PITCH      | WAVE AMPL. |
|-----------|--------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| FREQUENCY | PERIOD | WAVE AMPL. | AMPL.      | PHASE      | AMPL.      | PHASE      | AMPL.      |
| (RAD/SEC) | (SEC)  | AMPL.      | PHASE      | AMPL.      | PHASE      | AMPL.      | AMPL.      | PHASE      | AMPL.      | PHASE      | AMPL.      |
| 0.2513    | 25.000 | .5510      | 150.7      | .0015      | 165.3      | .5092      | -.16.1     | .0025      | 161.9      | .2164      | 160.2      |
| .3142     | 20.000 | .6661      | 156.5      | .0126      | 110.8      | .7383      | -.3.4      | .0166      | 111.0      | .2364      | 87.1       |
| .3307     | 19.000 | .7306      | 157.8      | .0111      | -58.2      | .0110      | -13.9      | .0141      | -59.1      | .0200      | 143.1      |
| .3491     | 18.000 | .7864      | 155.7      | .0029      | -75.0      | .0406      | -24.1      | .0036      | -79.7      | .1963      | 38.4       |
| .3696     | 17.000 | .8274      | 152.5      | .0118      | 115.9      | .8093      | -34.8      | .0156      | 115.8      | .1698      | 17.9       |
| - .3927   | 16.000 | .8336      | 149.1      | .0069      | 117.8      | .7488      | -46.3      | .0118      | 116.0      | .1546      | -2.1       |
| .4189     | 15.000 | .8492      | 145.7      | .0072      | 121.3      | .5970      | -62.9      | .0097      | 121.6      | .1344      | -15.6      |
| .4333     | 14.500 | .8408      | 144.6      | .0067      | 123.2      | .4650      | -72.3      | .0089      | 123.5      | .1296      | -21.4      |
| .4468     | 14.000 | .8272      | 144.0      | .0062      | 124.6      | .2970      | -67.3      | .0083      | 125.0      | .1276      | -24.8      |
| .4654     | 13.500 | .8132      | 144.0      | .0058      | 125.9      | .2454      | -37.4      | .0078      | 126.4      | .1316      | -27.2      |
| .4833     | 13.000 | .7924      | 144.3      | .0054      | 127.9      | .2717      | -12.4      | .0072      | 128.3      | .1335      | -28.6      |
| .5027     | 12.500 | .7664      | 145.1      | .0050      | 130.5      | .3059      | -.6        | .0067      | 130.8      | .1353      | -29.9      |
| .5236     | 12.000 | .7346      | 146.3      | .0063      | 134.0      | .3268      | 5.6        | .0083      | 134.2      | .1366      | -30.1      |
| .5464     | 11.500 | .6966      | 148.2      | .0059      | 137.8      | .3399      | 9.5        | .0078      | 137.9      | .1376      | -29.5      |
| .5712     | 11.000 | .6512      | 150.8      | .0059      | 142.2      | .3395      | 13.1       | .0073      | 142.3      | .1360      | -27.7      |
| .5984     | 10.500 | .5996      | 154.2      | .0051      | 147.2      | .3320      | 16.1       | .0068      | 147.2      | .1351      | -25.0      |
| .6263     | 10.000 | .5402      | 158.6      | .0053      | 153.3      | .3173      | 19.4       | .0070      | 153.2      | .1326      | -21.0      |
| .6614     | 9.500  | .6723      | 164.2      | .0049      | 160.2      | .2961      | 23.2       | .0065      | 160.1      | .1282      | -15.6      |
| .6981     | 9.000  | .3958      | 171.2      | .0645      | 168.3      | .2686      | 27.7       | .0059      | 168.2      | .1211      | -8.8       |
| .7392     | 8.500  | .3108      | 179.7      | .0042      | 177.8      | .2358      | 32.8       | .0056      | 177.6      | .1115      | -.2        |
| .7854     | 8.000  | .2103      | -169.7     | .0036      | -170.0     | .1978      | 38.9       | .0048      | -170.8     | .0966      | 10.4       |
| .8376     | 7.500  | .1216      | -156.6     | .0030      | -157.0     | .1562      | 45.9       | .0039      | -157.1     | .0823      | 23.6       |
| .8976     | 7.000  | .0275      | -140.0     | .0022      | -140.3     | .1130      | 53.3       | .0029      | -140.3     | .0627      | 40.8       |
| .9666     | 6.500  | .0524      | 60.7       | .0013      | -119.5     | .0721      | 59.3       | .0017      | -119.5     | .0412      | 60.3       |
| 1.0472    | 6.000  | .0993      | 86.6       | .0003      | -93.1      | .0395      | 58.4       | .0004      | -93.1      | .0199      | 66.5       |
| 1.1424    | 5.500  | .0902      | 120.4      | .0006      | 120.1      | .0220      | 39.7       | .0008      | 120.1      | .0201      | 117.9      |
| 1.2566    | 5.000  | .0124      | 164.5      | .012       | 164.4      | .0205      | 20.1       | .0015      | 164.4      | .0095      | -15.5      |
| 1.3963    | 4.500  | .0974      | 44.1       | .0058      | -136.0     | .0250      | 42.3       | .0011      | -136.0     | .0143      | 43.9       |
| 1.5708    | 4.000  | .1107      | 127.5      | .0003      | 127.4      | .0179      | 118.2      | .0004      | 127.4      | .0101      | 127.3      |
| 2.0944    | 3.000  | .0496      | 76.6       | .003       | -103.4     | .0139      | 83.7       | .0003      | -103.4     | .0079      | 76.6       |

## SEMI-SUBMERSIBLE ADDING

DRAFT = 75.0 FEET      TRIM ANGLE = .00 DEG.  
 HEADING = .00 DEG.      FORWARD SPEED = .00 KNOTS      G-METACENTER = 32.1 FEET  
 ROLL GYR. RADIUS = 75.00 FEET      PITCH GYR. RADIUS = 1/20      WAVE STEEPNESS = 1/20  
 YAW GYR. RADIUS = 75.0 FEET

## STATISTICS OF MOTIONS IN IRRREGULAR SEAS

OF BODY JACKV

## SEA SPECTRUM

ISSC --- SIGNIFICANT HEIGHT = 40.0 FEET      PERIOD = 12.0 SECONDS

## SINGLE AMPLITUDE MOTIONS

|                      | SURGE<br>-1 FEET) | SWAY<br>-1 FEET) | HEAVE<br>-1 FEET) | ROLL<br>---(DEG)--- | PITCH<br>---(DEG)--- | YAW<br>---(DEG)--- |
|----------------------|-------------------|------------------|-------------------|---------------------|----------------------|--------------------|
| ROOT MEAN SQUARE     | 7.150             | .072             | 5.196             | .095                | 1.491                | .001               |
| AVE OF 1/3 HIGHEST   | 14.299            | .144             | 10.392            | .190                | 2.901                | .003               |
| AVE OF 1/10 HIGHEST  | 18.232            | .184             | 13.250            | .243                | 3.001                | .004               |
| AVE OF 1/100 HIGHEST | 23.680            | .240             | 17.355            | .318                | 4.978                | .005               |

## STATISTICS OF ACCELERATION IN IRRREGULAR SEAS

## SINGLE AMPLITUDES

|                      | SURGE<br>( FEET / SEC <sup>2</sup> ) | SWAY<br>( FEET / SEC <sup>2</sup> ) | HEAVE<br>( FEET / SEC <sup>2</sup> ) | ROLL<br>(DEG / SEC <sup>2</sup> ) | PITCH<br>(DEG / SEC <sup>2</sup> ) | YAW<br>(DEG / SEC <sup>2</sup> ) |
|----------------------|--------------------------------------|-------------------------------------|--------------------------------------|-----------------------------------|------------------------------------|----------------------------------|
| ROOT MEAN SQUARE     | 1.620                                | .015                                | .005                                 | .020                              | .362                               | .000                             |
| AVE OF 1/3 HIGHEST   | 3.240                                | .031                                | 1.970                                | .041                              | .723                               | .000                             |
| AVE OF 1/10 HIGHEST  | 4.131                                | .039                                | 2.512                                | .052                              | .922                               | .001                             |
| AVE OF 1/100 HIGHEST | 5.411                                | .051                                | 3.290                                | .068                              | 1.208                              | .001                             |

\*\*\*\*\* OSCAR \*\*\*

SEASUBMERSIBLE MUDRIG

DATE 05/12/09

## STATISTICS OF LINE TENSION VARIATION

IN

## SEA SPECTRUM

TSSC --- SIGNIFICANT HEIGHT = 40.0 FEET PERIOD = 12.0 SECONDS

TENSIONS IN KIPS

CONNECTED TO

| LINE<br>NAME | LINE<br>TYPE | STATISTICS OF TENSIONS |             |                                    |
|--------------|--------------|------------------------|-------------|------------------------------------|
|              |              | BODY<br>ONE            | BODY<br>TWO | MEAN                               |
|              |              | ANS                    | 1/3         | HIGHEST 1/10 HIGHEST 1/100 HIGHEST |
| LEG1         | CHAIN        | JACKY                  | GROUND      | 67.                                |
| LEG2         | WIRE         | JACKY                  | GROUND      | 76.                                |
| LEG3         | WIRE/CHAIN   | JACKY                  | GROUND      | 104.                               |
| LEG4         | WIRE         | JACKY                  | GROUND      | 142.                               |
| LEG5         | CHAIN        | JACKY                  | GROUND      | 161.                               |
| LEG6         | CHAIN        | JACKY                  | GROUND      | 161.                               |
| LEG7         | WIRE         | JACKY                  | GROUND      | 142.                               |
| LEG8         | WIRE/CHAIN   | JACKY                  | GROUND      | 104.                               |
| LEG9         | WIRE         | JACKY                  | GROUND      | 75.                                |
| LEG10        | CHAIN        | JACKY                  | GROUND      | 96.                                |
|              |              |                        |             | 104.                               |
|              |              |                        |             | 110.                               |
|              |              |                        |             | 114.                               |
|              |              |                        |             | 100.                               |
|              |              |                        |             | 107.                               |
|              |              |                        |             | 112.                               |
|              |              |                        |             | 114.                               |
|              |              |                        |             | 117.                               |
|              |              |                        |             | 195.                               |
|              |              |                        |             | 210.                               |
|              |              |                        |             | 221.                               |
|              |              |                        |             | 225.                               |
|              |              |                        |             | 245.                               |
|              |              |                        |             | 225.                               |
|              |              |                        |             | 245.                               |
|              |              |                        |             | 196.                               |
|              |              |                        |             | 210.                               |
|              |              |                        |             | 232.                               |
|              |              |                        |             | 106.                               |
|              |              |                        |             | 109.                               |
|              |              |                        |             | 104.                               |
|              |              |                        |             | 113.                               |
|              |              |                        |             | 110.                               |
|              |              |                        |             | 114.                               |
|              |              |                        |             | 120.                               |

LEVEL 5 MODE26.6 OCTOBER 1985 SER100

END OF PROCESSING